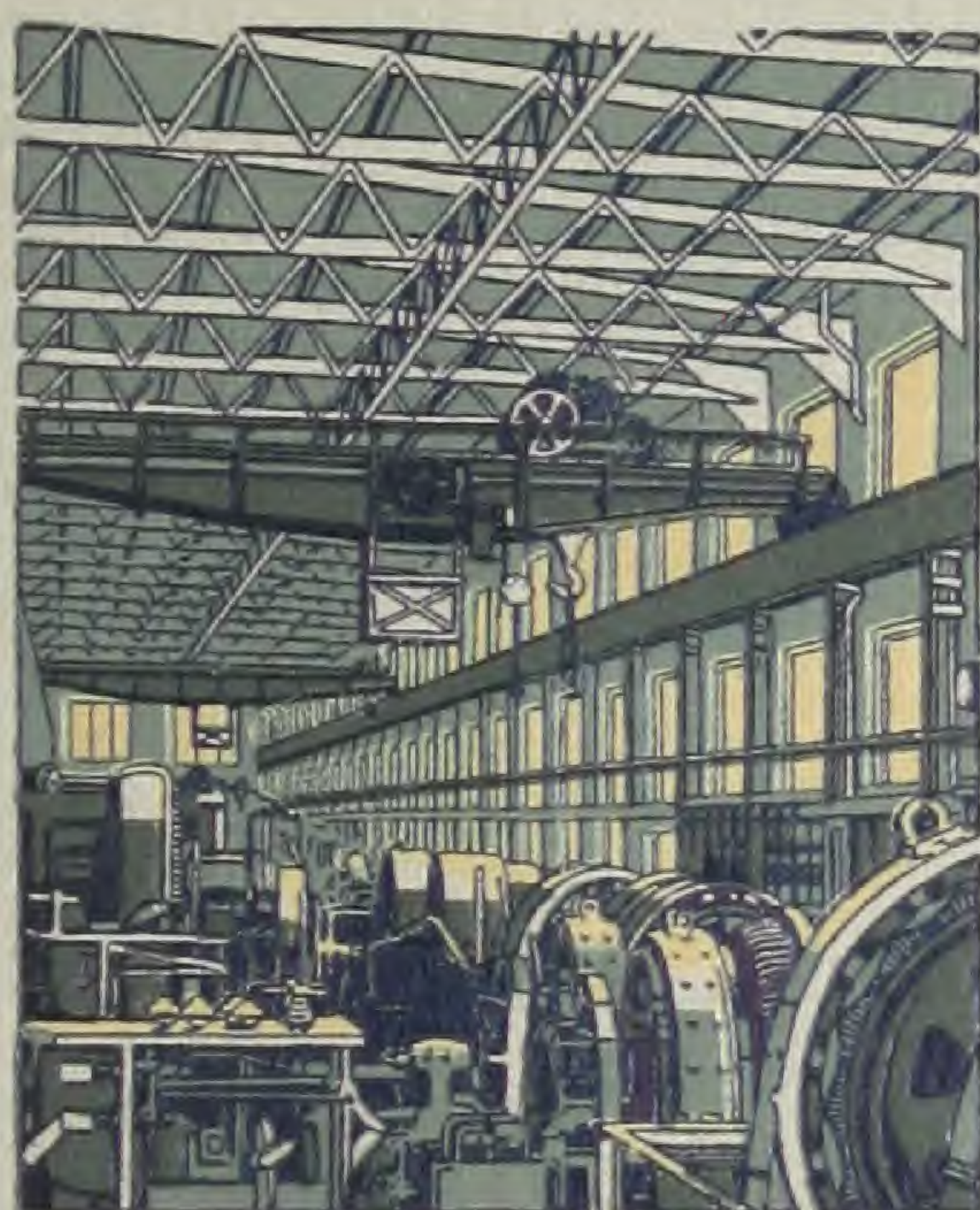


651-7.

America's Largest Electrical Workshop



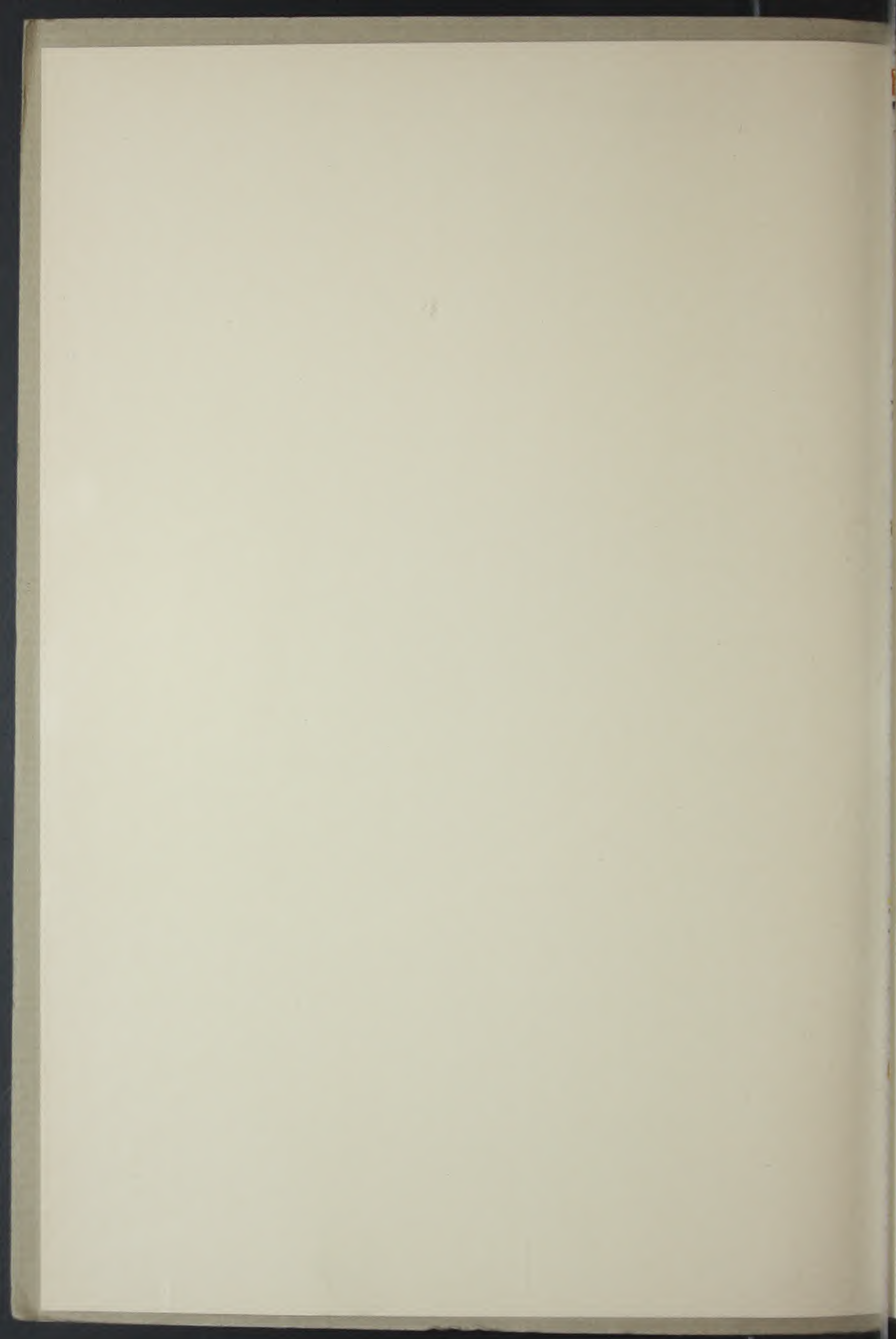
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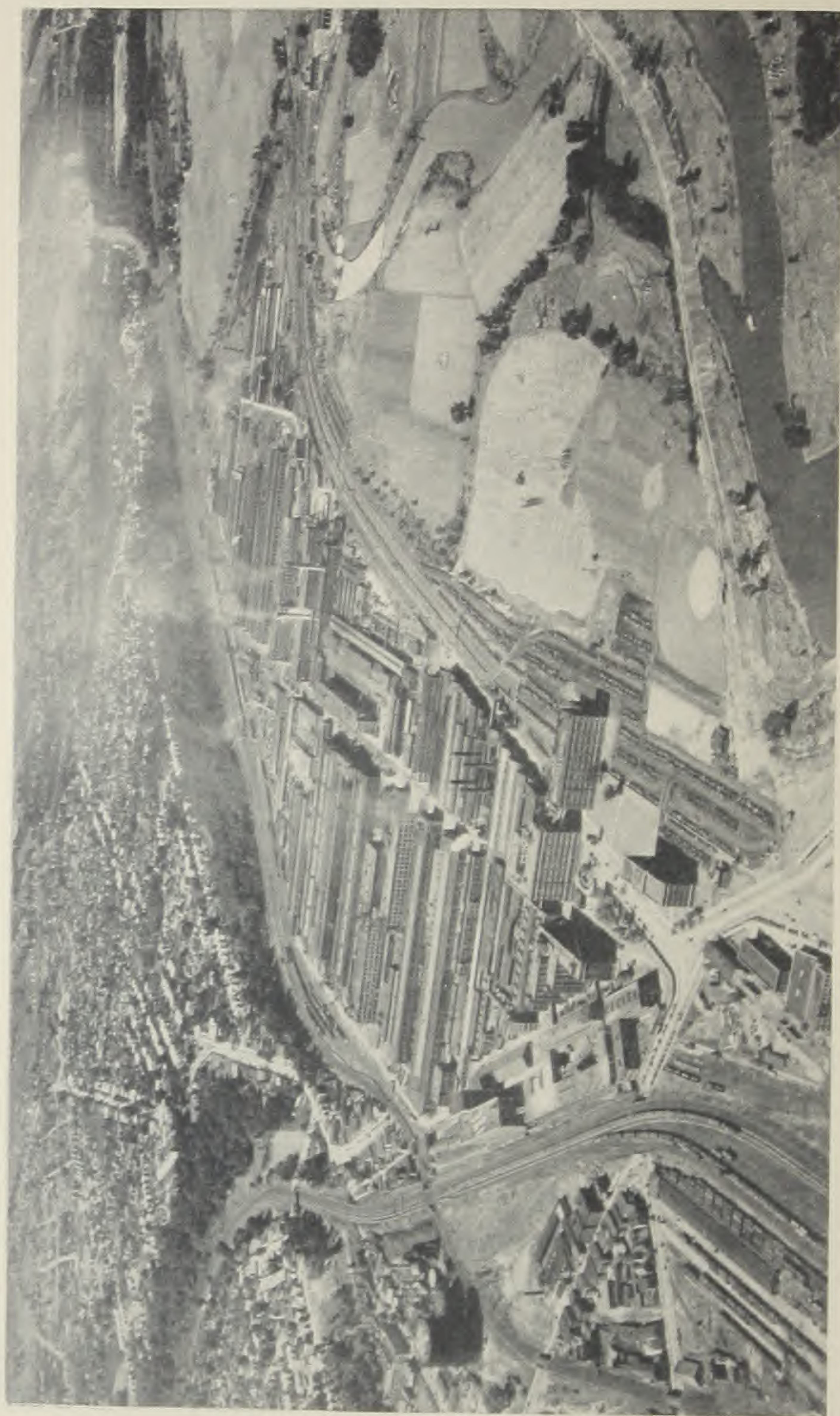
AMERICA'S
LARGEST ELECTRICAL
WORKSHOP



SCHENECTADY WORKS
OF THE
GENERAL ELECTRIC COMPANY

DECEMBER, 1928

GEB-9A



THE SCHENECTADY WORKS OF THE GENERAL ELECTRIC COMPANY

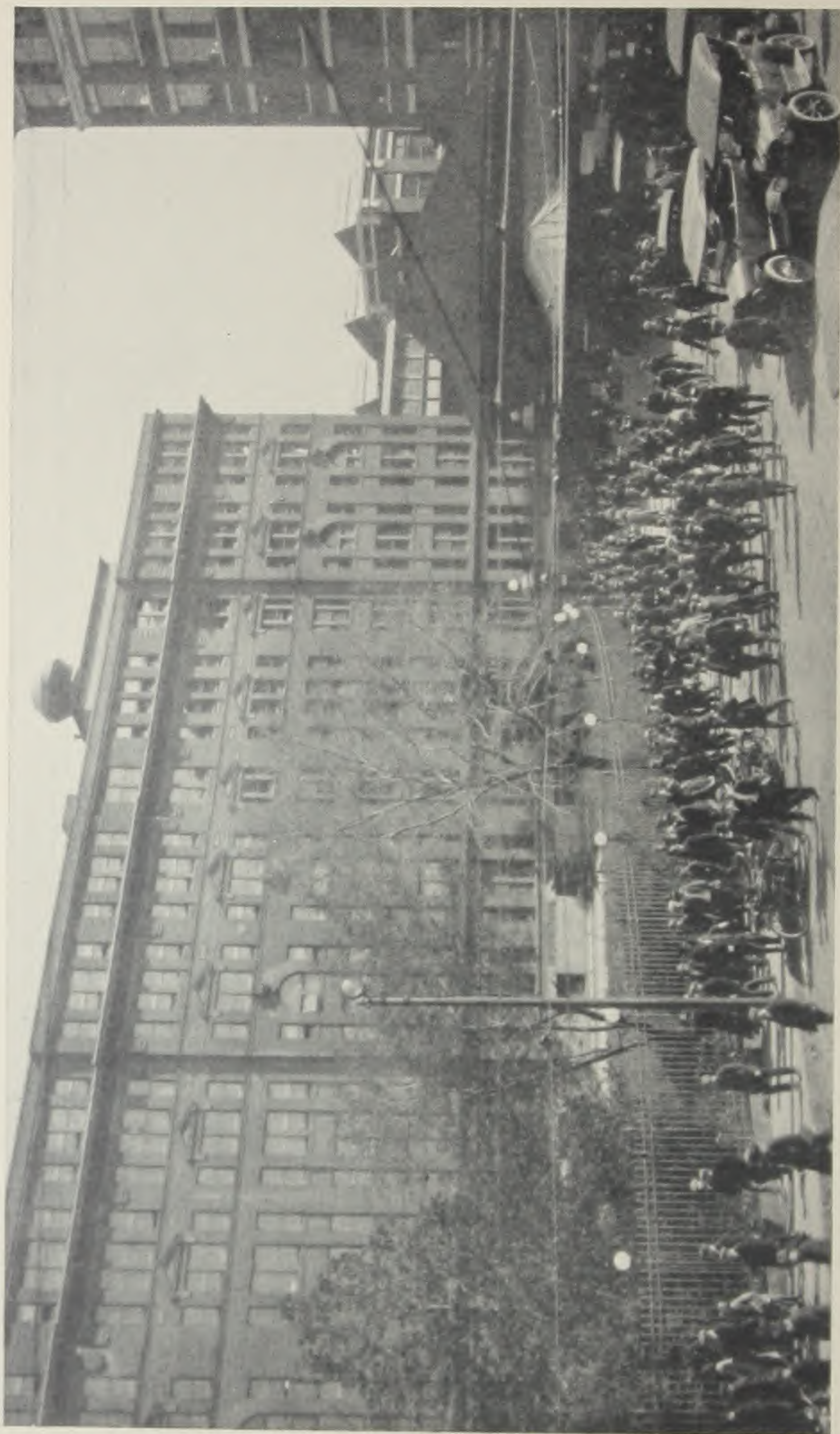
This is the largest of the Company's factories. It comprises more than 353 buildings with a total floor space of 6,579,684 square feet and occupies an area of 645 acres

AMERICA'S LARGEST ELECTRICAL WORKSHOP

THE Schenectady Works of the General Electric Company stands at the eastern entrance to the Mohawk Valley. Close by, is the site of the palisaded settlement which, in the year 1661, pointed the westward impulse of civilization and which has since become a notable city of over ninety thousand inhabitants. From here, explorers and settlers have opened long paths to distant lands of opportunity. Here, with fine symbolism, a noble bridge has been named The Great Western Gateway; and here the General Electric Company preserves the pioneer tradition and spirit by its leadership in the design and manufacture of electric apparatus—products that are aiding human progress throughout the Nation and beyond its borders.

At Schenectady, General Electric has established its principal administrative offices, whence radiate influences that aid the whole electrical industry in its business of furthering scientific, commercial, and cultural advance. Most of these offices are in Building 2, which fronts the main gate and is one of the largest office buildings in America used exclusively by one company.

In addition to departments which are charged with administration of General Electric's affairs or are occupied with various forms of general service to its organization, most of the principal sales departments of the Company are also at Schenectady. Here engineering knowledge is combined with commercial experience to extend the market for G-E products and to serve purchasers in matters of installation and operation.



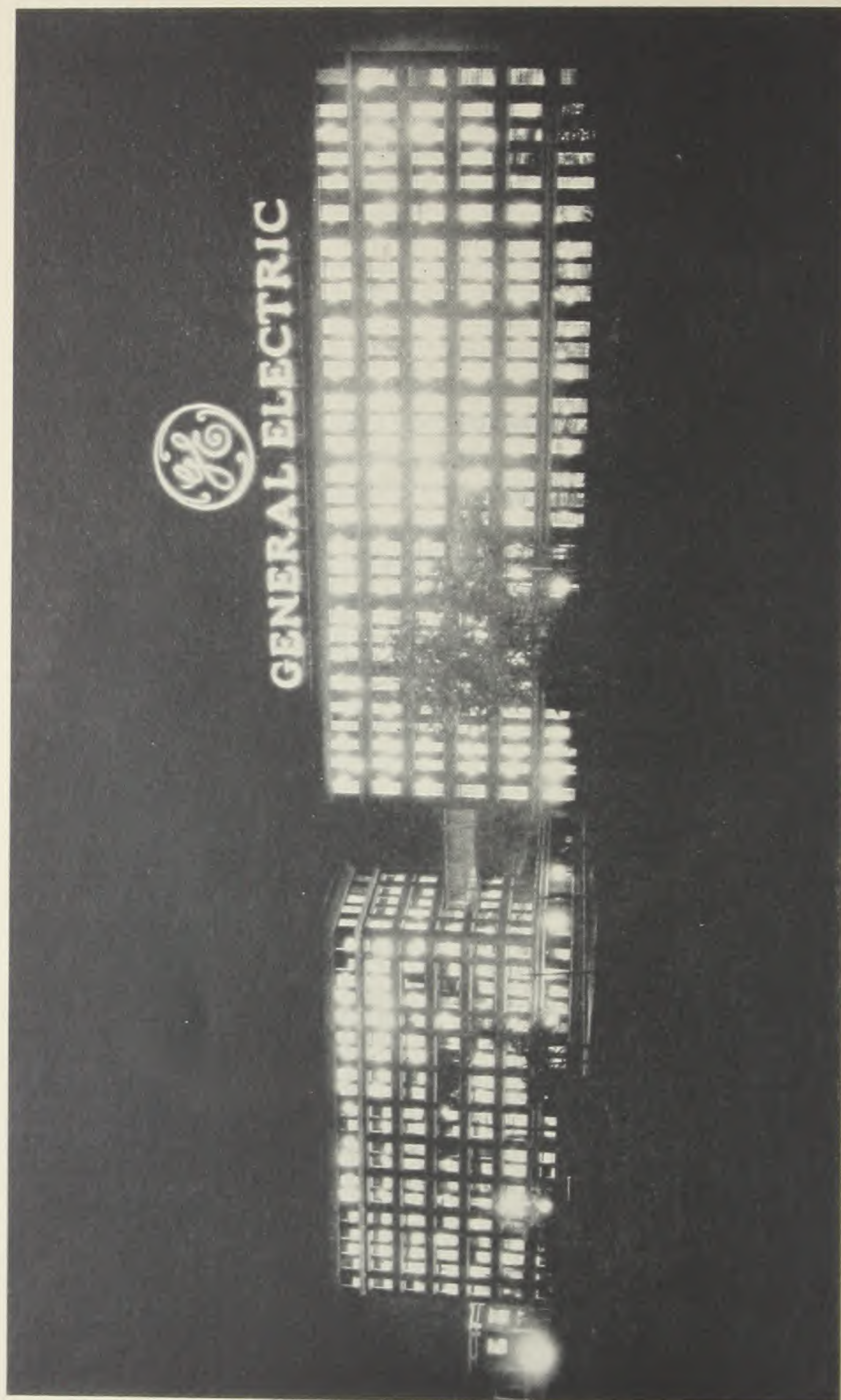
THE MAIN GATE AT CLOSING TIME

The Schenectady Works and General Office employ over 20,000 people

THE Schenectady Works is the largest electrical manufacturing plant in America. Turning from Building 2, one faces the long vista of "Works Avenue," lined on both sides with factories and crowned by the lofty towers of WGY, one of the country's oldest radio broadcasting stations. This avenue and its intersecting streets may well be likened to those of a modern city. On an area of 645 acres and with a total floor space of over six and a half million square feet, 353 buildings house a daily population of from 18,000 to 20,000 men and women, not including the 2000 who occupy the general offices. Manufacturing activities are conducted from Building 41, situated at a central and convenient location with respect to the shops. The executives are assisted by a Works Council elected by the employees. Safety and order are promoted by a fire department equipped with modern apparatus and by a patrol department of 90 members.

Within the plant are 33 miles of track on which 22 electric locomotives and 800 freight cars are operated, while a fleet of 160 automobiles and trucks also plays an important part in the traffic. Beneath the pavements is an elaborate system of pipes and conduits which serves the community's needs for heat, light, water, and power. The pumping system has a daily capacity of 25,000,000 gallons, exclusive of the drinking-water system, and the radiators and pipe coils are sufficient to heat more than 2700 homes of average size. Communication is made easy by an automatic telephone system which includes more than 3500 instruments. The Schenectady Works has its own athletic fields and surgical dispensaries; its restaurants served, in 1927, a total of 1,451,548, meals; and a commodious parking area is provided for employees' automobiles.

It would take too long a time to study all the shops of the Schenectady Works; we must be content with a brief visit to a few typical factories. From these we may estimate methods of manufacture and the nature of the products.



THE RESEARCH LABORATORIES AT NIGHT

The sign on the new laboratory building can be seen at a distance of more than four miles

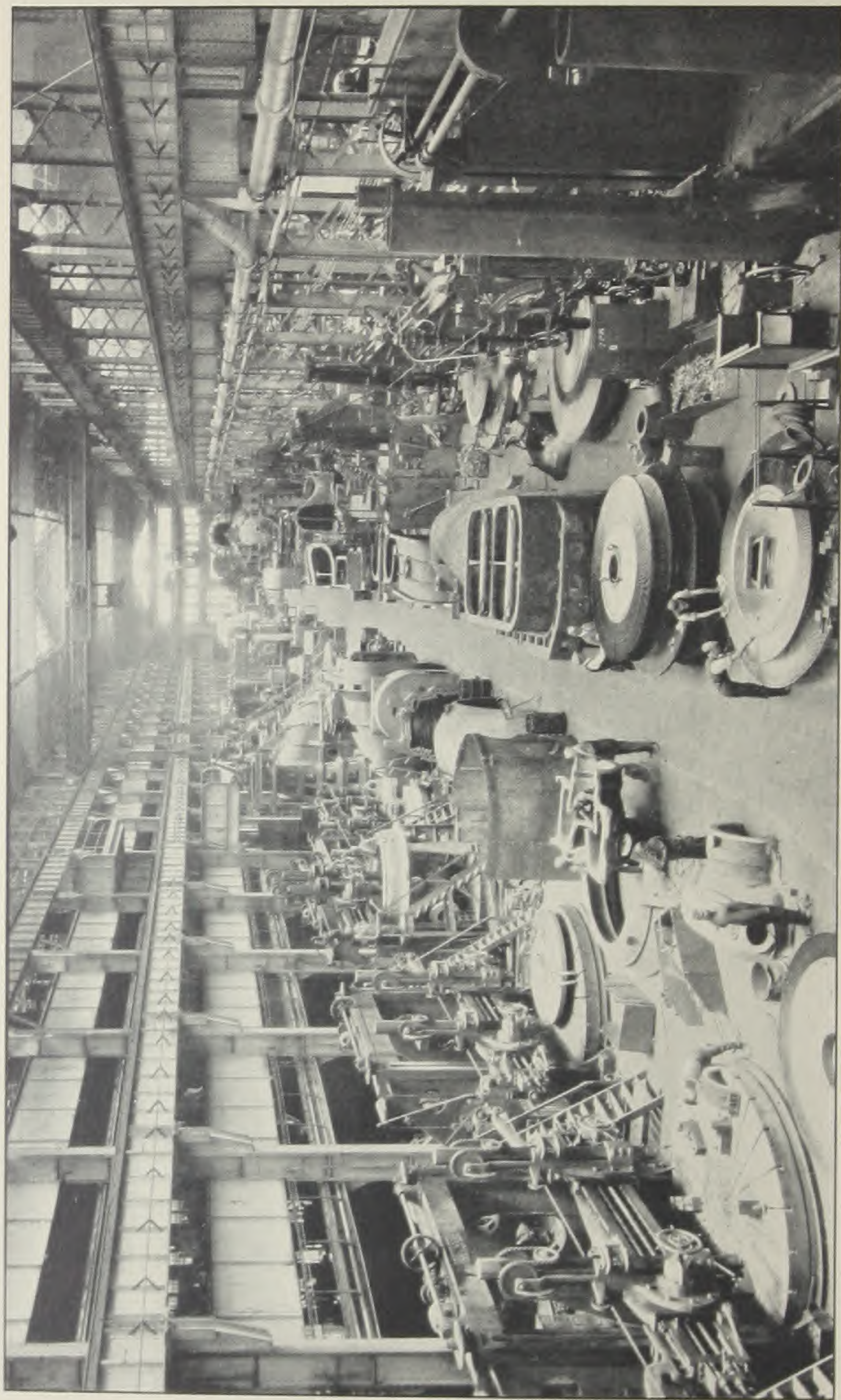
These products include:

Large steam turbine-generator sets	Motors and generators for ship propulsion
Synchronous converters	Mercury-arc rectifiers
Synchronous condensers	Elevator motors and control
Frequency-changer sets	Motor- and generator-control apparatus
Large waterwheel generators	Voltage regulators
Motor-generator sets	Searchlights
D-c. motors and generators	Marine generator sets
A-c. motors and generators	Wire and cable
Induction motors	Refrigerators
Motors and generators for steam-railroad electrification	Radio apparatus

While it is not always safe to measure excellence in terms of size, we must consider that the electrical service supplied by most of these products widens in scope in proportion to the capacity—and hence to the dimensions—of the apparatus. This greater size, in turn, requires heavier and larger manufacturing machinery. Therefore, the unusual magnitude of apparatus and of operation in the General Electric shops demands notice in even a brief description.

These characteristics, together with finished craftsmanship guided by expert design, are so general and distinctive a feature of manufacture at the Schenectady Works that a few shops, selected for diversity of product, will fairly represent the whole.

More than 15 years of research and development are behind the activities in Building 23. Several thousand refrigerators of 19 different types were field-tested and improved before the present models were standardized. In all, upwards of 300,000 square feet of floor space and the services of 1400 skilled workers are devoted to the production of electric refrigerators at a rate faster than one every minute. Every part is carefully inspected; and at many stages of assembling, thorough tests are conducted. Every refrigerator unit, as it leaves the loading platform of Building 23, carries with it the evidence of trained hands, coördinated effort, and rigid standards of manufacture.



VIEW OF THE MAIN BAY, BUILDING 60

Building 60 is one of the largest machine shops in the world. It is here that large steam turbine-generators are assembled and tested

Notable among these shops is Building 16, where water-wheel-driven turbines and large motors are made. Here is a 65-foot boring mill—one of the largest of its kind in the world. Of the 233,784 square feet of area in this shop, an iron floor occupies 14,500. On account of the huge size of the castings that must be handled, they are set up and machined with electrically driven tools on this flooring, which thus virtually constitutes a vast bench at which the giant Electricity performs his mighty and nicely accurate labor.

Building 17 presents another aspect of Schenectady Works production. Here 6,000,000 pounds of sheet steel are consumed each month. Speed—sheer, bewildering speed—compels attention to the punch presses, some of which pour out metal parts at the rate of 700 every minute. The total capacity of this department is a million and a half stampings per hour. The weight of the smallest punching is .00001224 of a pound; the largest weighs 880 pounds. In the same building are 15 electric welding machines that make an average total of 600,000 welds a day.

Building 49 houses some of the largest lathes ever built. These are required to machine the ponderous rotor forgings for large steam turbine-generators.

Although the machinery and products of these shops have given the visitor opportunity to adjust his appreciation to an extraordinary scale of manufacture with its suggestion of corresponding electrical capacity, he can hardly be prepared for the majestic dimensions and far-reaching vistas of Building 60, the largest shop in the Schenectady Works. It is 800 feet long and 340 feet wide, with a floor area of more than half a million square feet, including the galleries. Its construction demanded about 8400 tons of steel, 4,000,000 bricks, 100 miles of wire, 10 miles of steam pipe, and 154,000 square feet of window and skylight glass.

Building 60 is, in large part, devoted to the making and assembly of steam turbine-generators of the largest capacities—machines of such dimensions as are indicated by illustrations in this book. To move the great machinery parts from point to point, 44 overhead electric cranes are



WIRE AND CABLE DEPARTMENT, BUILDING 85

“The raw material is received at one end of the structure and the finished product is loaded on cars at the opposite end”

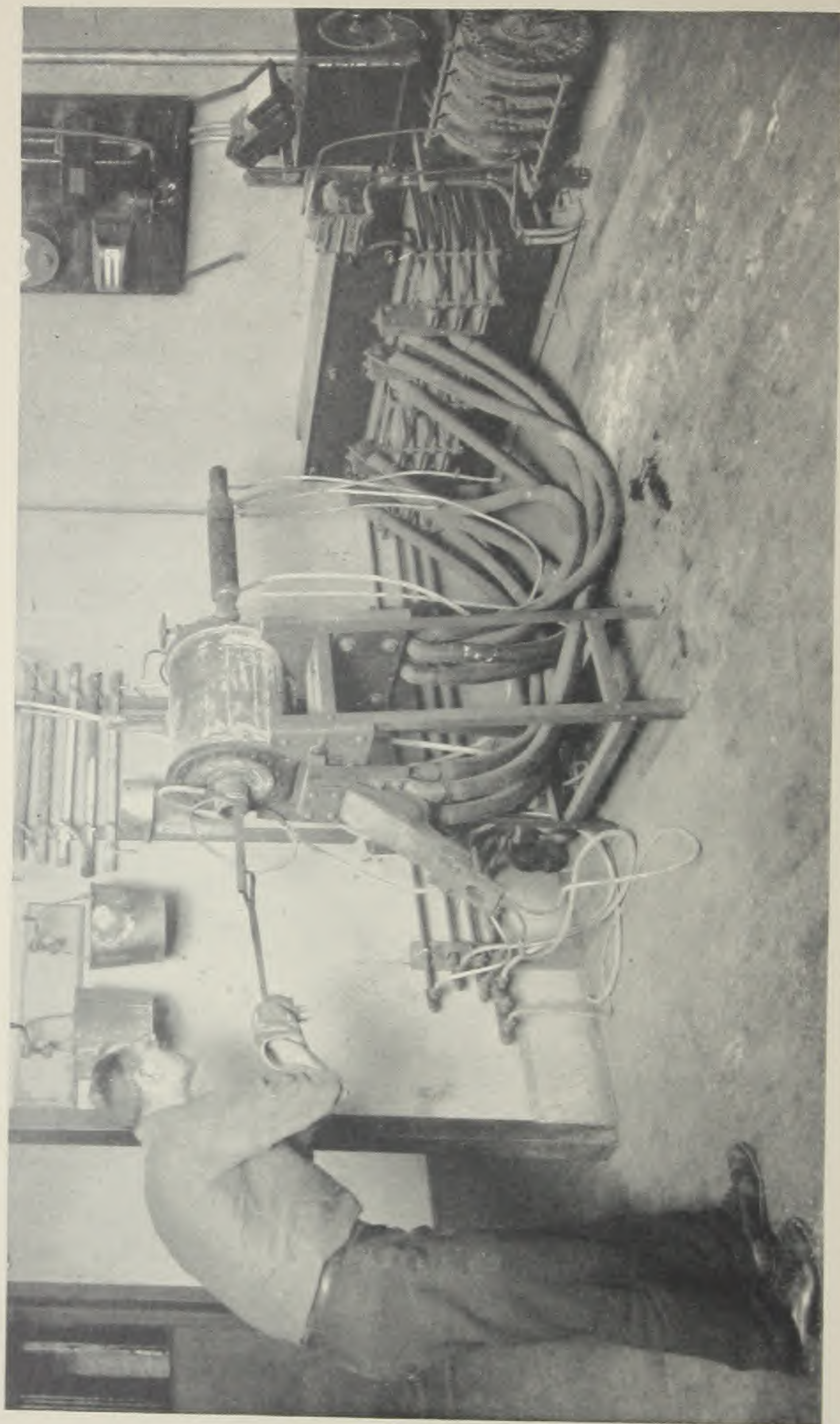
required, several of which have a lifting power of 100 tons each. The shop is equipped also with 900 motor-driven tools operated by 1500 motors, which furnish a total of about 13,000 horsepower. There are few great factory buildings in which electric power so conspicuously serves the minds that direct it; there is, perhaps, no other in which has been fabricated machinery with a capacity for so large a production and so wide a distribution of electric energy.

In Building 68, the ancient art of the potter is applied to the requirements of electrical manufacture through modern machinery capable of large-quantity production. The 80 presses and the kilns in this porcelain factory daily convert 16 tons of raw material into about 275,000 pieces of porcelain.

It may seem a long step from porcelain to wire, but in the manufacture of these products at the Schenectady Works there is the same careful direction of process, the same reliance on modern machinery, and the same provision for production in large volume.

In Buildings 85 and 109, three billion feet of insulated wire and 31 billion feet of uninsulated wire—having a total weight, in copper alone, of 25,000,000 pounds—are manufactured yearly. Building 85 contains two parallel units which can be used simultaneously or separately. The raw material is received at one end of the structure, and the finished product is loaded on cars at the opposite end at a rate of about 1,000,000 pounds of finished cable per week.

Building 77, situated almost at the southern end of "Works Avenue," is dedicated to the youngest and most humanly intimate branch of the electrical art. Here is made radio apparatus for both transmission and reception. The products of this factory embody the latest inventions and refinements of the Company's radio engineers, and, through their ever-increasing excellence, are bringing pleasure and benefit to homes in every part of the continent. General Electric has contributed three broadcasting stations to the service of this art—WGY, at Schenectady; KOA, at Denver;



THE HOTTEST SPOT IN THE RESEARCH LABORATORY, BUILDING 5

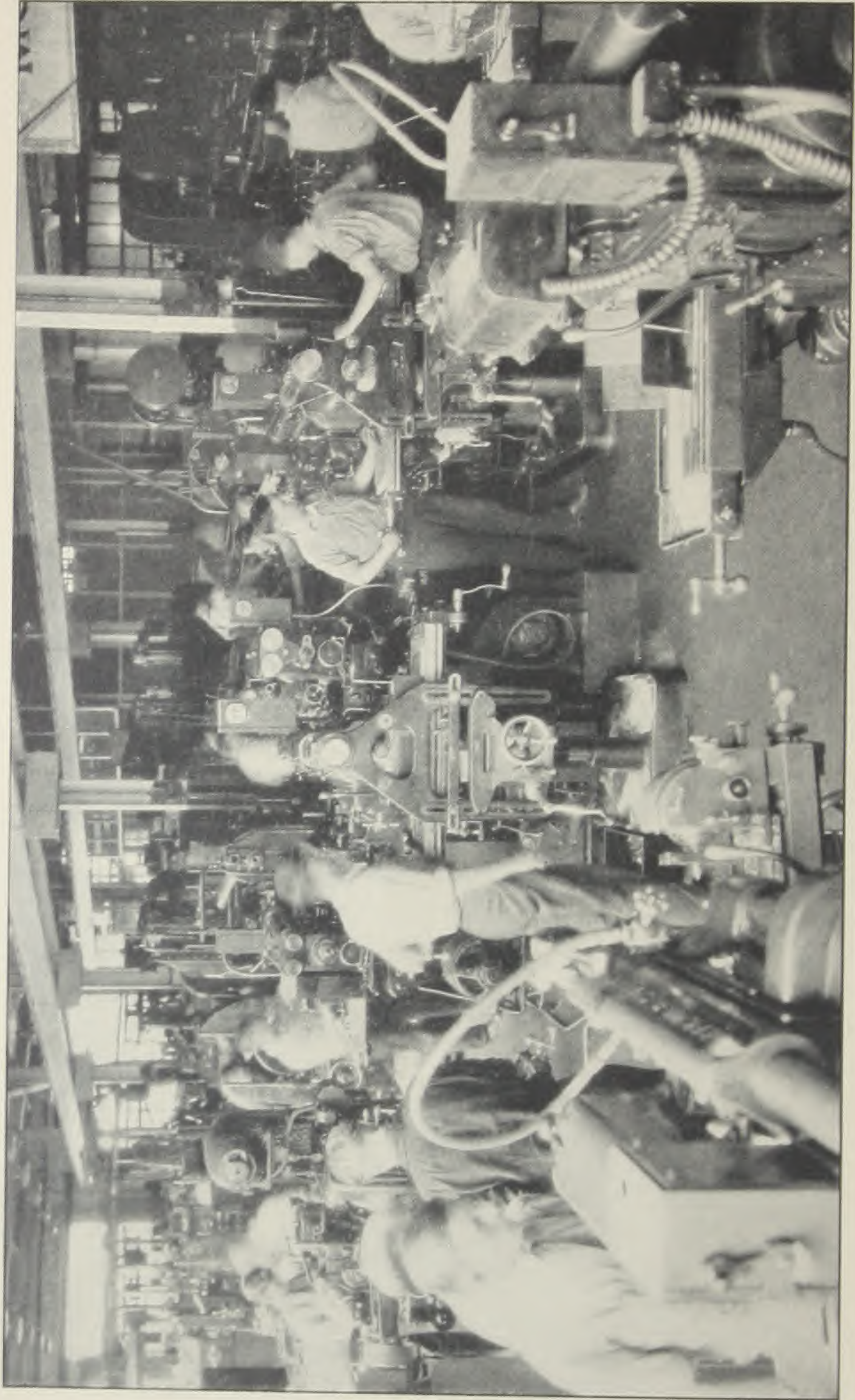
This small electric furnace develops a temperature of 4500 degrees F.

It is used in the production of ductile tungsten

and KGO, at Oakland. The towers of WGY, on the roof of Building 40, rise to a height of 265 feet from the ground and are 352 feet apart. The studio and engineering staffs of this station number 23 persons, who, in their several capacities, supervise the broadcasting of programs originating at Schenectady and of material received by wire from prominent musical centers.

To one who has visited these representative buildings of the Schenectady Works, the question is likely to occur: "How does General Electric 'make delivery'?" Statistics of the Shipping Department show that it occupies, in all, eight or nine acres, that it uses 14,500,000 board feet of lumber a year, 170,000 pounds of banding iron, 216,000 pounds of wrapping paper, and—each day—a ton and a half of nails. The Department receives about 160,000 orders and loads nearly 13,000 cars annually. About 230,000 memoranda of shipments are sorted and mailed each year. Containers to the number of 1,800,000 are used annually to ship products having a total tonnage of 170,000. Shipping facilities throughout the Works enable the loading of 107 cars at one time.

The Research Laboratory, occupying Buildings 5 and 37, is not only the scientific fountainhead of the whole Company in all matters pertaining to research and development; it is an institution of international authority and importance. Its large staff of technical investigators, recruited from almost every department of physical science, is not only engaged in the study of electrical phenomena and materials; it also makes valuable contributions to branches of knowledge that have, perhaps, only an indirect relation to electrical development but are of the first importance in other industrial fields and in the sphere of pure science. In this laboratory, through brilliant theory and patient experiment, the incandescent lamp was brought from its early form to its present high effectiveness and general availability. Here also, x-ray apparatus, essential in modern medical diagnosis, and power tubes, important in many technical applications, have been developed. The millions of dollars invested by



APPRENTICE DEPARTMENT, BUILDING 16

Here young men of mechanical ability are prepared for successful trade careers

General Electric in the equipment and maintenance of the Research Laboratory have returned rich dividends in the form of scientific understanding and humanitarian service.

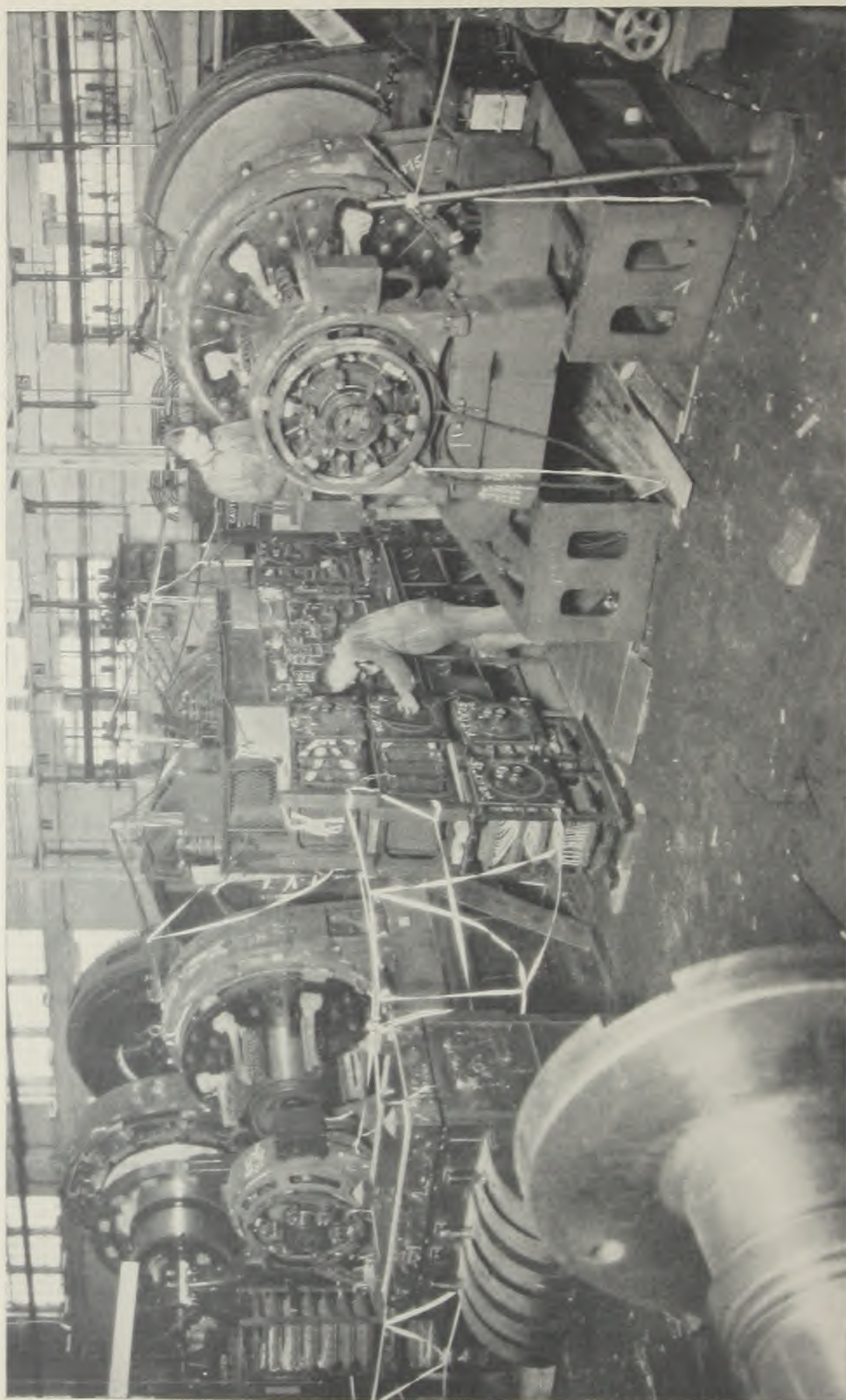
Building 37, adjacent to Building 5 and conspicuous because of the great electric sign on its roof, is devoted principally to the manufacture of laboratory products.

The scientific equipment at the Schenectady Works also includes laboratories for general engineering and for the testing of materials, as well as an Illuminating Engineering Laboratory situated outside the Works proper, where the spectacular floodlighting of the Panama-Pacific Exposition and that of Niagara Falls were planned.

The Works management welcomes visitors who are interested in scientific and industrial development. The service of guides is available at stated hours each day and covers the points of principal interest described in the foregoing pages. Special arrangements are made for the reception of conventions, technical societies, and student bodies, and it is the object of the management to render these visits informative and pleasant.

The General Electric Company has established an educational as well as a scientific and an industrial center at Schenectady. In the development of a curriculum, the Company has been prompted by a sense of moral obligation to give its employees suitable help in improving their understanding and also by a prudent concern for the future of the electrical industry itself. On the one hand, it seeks to supply those elements of knowledge which may be missing in the lives of competent employees; on the other, it recognizes the importance of sending out young men completely equipped to serve the large purposes of the industry in other fields.

For foreign-born employees who desire to qualify themselves for American citizenship, a free course of instruction is conducted by teachers recruited from the G-E organization. The subjects include, so far as is necessary, all those taught in elementary schools, with special attention to reading and writing English.



TESTING MOTOR-GENERATORS, BUILDING 16

Every machine made is subjected to rigid tests

For boys and young men who possess mechanical ability and who have not gone beyond grade or high school, a four-year course of paid educational employment offers a valuable foundation for the trade career in which they respectively develop the greatest aptitudes. At the same time, they attend graded classes in mathematics, mechanical drawing, and such other subjects as will add to their mental and technical equipment and will further their advancement either with this company or elsewhere.

Evening vocational courses are available in shop arithmetic, English, typewriting, stenography, engineering mathematics, machine design, blueprint reading, mechanical drawing, electrical engineering theory, shop practice, and cognate subjects. These courses, offered to employees who desire to improve their qualifications for advancement, maybe supplemented by intensive instructions in commercial and administrative work, accounting, auditing, and commercial law, and by special training in technical sales promotion.

A Factory Training Course is conducted for a limited number of engineering graduates who are interested in work of an executive nature in the manufacturing organization. The students obtain experience in the factory by assignments to several departments doing work on all types of machine tools and also by working in the foundry and pattern shop. They become familiar with shop office practice by assignments to production, piece rate, and cost departments. They are also given special work in the Business Training Course for the purpose of obtaining experience in business organization and accounting.

The Student Engineering Course, open to college graduates in engineering, supplements theoretical instruction with study and practical experience in design, manufacture, construction, and research in the shops. Its object is to train young engineers for positions in the designing, commercial, and executive departments, and for service with public utility companies. It is often referred to as the "Test Course", and the student engineers are popularly called



EDISON CLUB HALL

The many social and educational activities of the Edison Club are conducted in this building



GENERAL ELECTRIC WOMAN'S CLUB

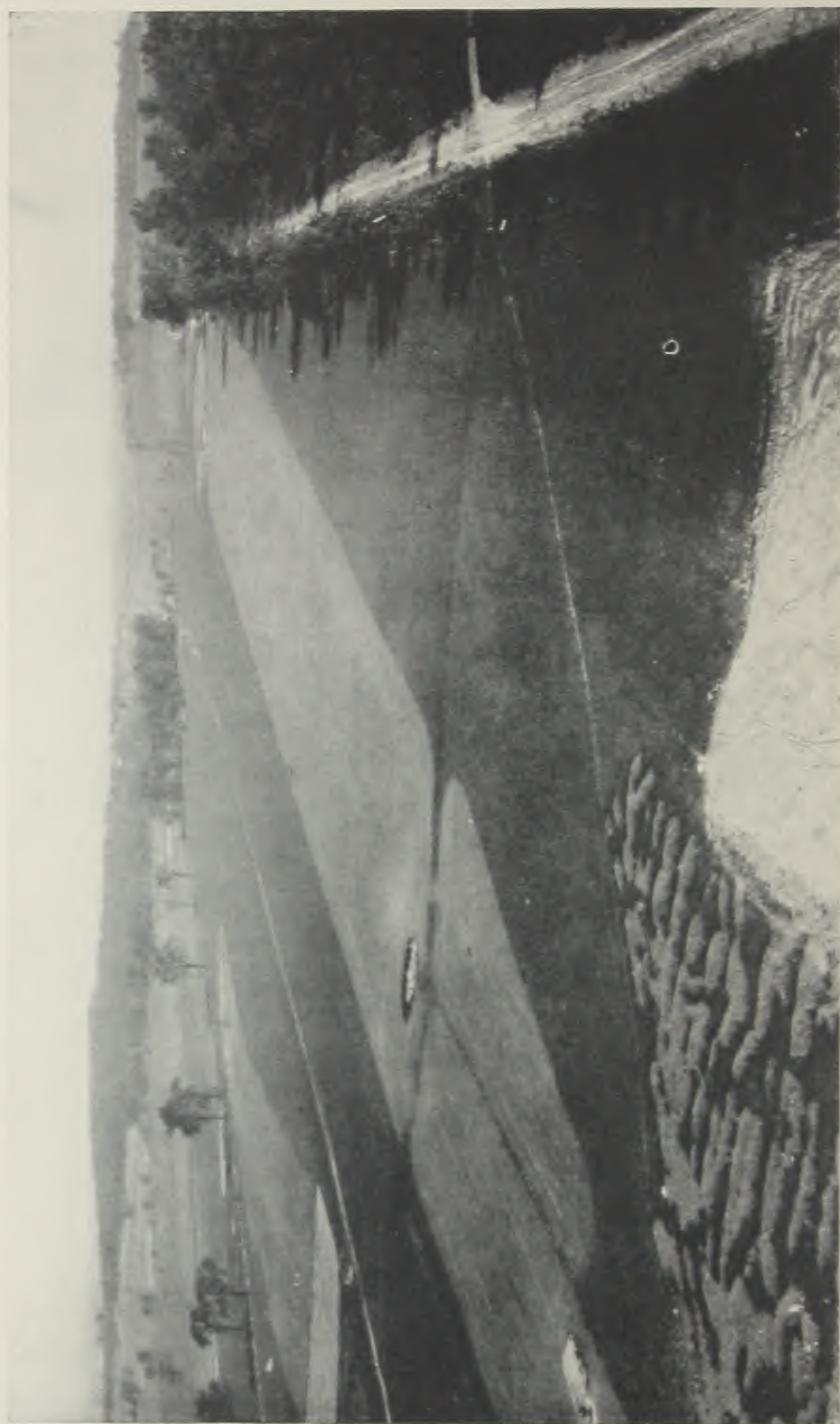
In this club home, women employees find congenial company and form lasting friendships

"Test Men". The apparatus is delivered for testing as assembled units. The students wire, start, and adjust these units, making sure that they meet specifications and are in proper condition before they are finally approved and shipped. The average time of training is from 12 to 15 months, and the number admitted to the course varies from 300 to 500 annually. Approximately 135 colleges and 25 nations have been represented in this student body.

To a limited number of highly qualified men, General Electric offers a three-year advanced course in design engineering, the last two years of which are spent in the Company's engineering offices, where actual day-by-day problems are solved. Here the opportunity to develop leadership in technical fields is very favorable for men of distinctive ability.

A sales course is conducted for those who desire to enter the sales engineering field, and a course in accounting, administration, and like subjects is available for graduates of non-technical colleges. Those who wish to earn post-graduate degrees in engineering may take up the necessary work at Union College, Schenectady, while employed by the Company. Several undergraduate scholarships at Union College have been established by General Electric for young men in its employ and for sons of employees.

It is as important to encourage men and women in the practice of thrift as to help them increase their earning power. The General Electric Company offers to the members of its organization advantageous investments and provision for a possible time of trouble. It has organized the G.E. Employees Securities Corporation, the funds of which are invested in General Electric securities and in those of electrical public utilities. The bonds of this corporation are sold to G-E employees, who may buy them either for cash or by weekly or monthly deductions from pay. These bonds return six per cent interest, to which General Electric adds two per cent so long as the holder remains in its employ. These issues, redeemable at any time, have been subscribed to an amount of over \$36,000,000 by more than 30,000 employees.



GOLF COURSE AT THE EDISON COUNTRY CLUB

This excellent golf course was particularly planned for the use of
General Electric employees

Recognizing the value of continuity of service, the Company gives supplementary compensation to those who have been in its employ for five years and who receive less than \$4000 a year. This compensation (five per cent of the employees' annual pay) amounted in 1927 to more than \$2,900,000.

There are 19,000 employees at the Schenectady Works who are covered for \$23,000,000 of group life insurance, the premiums being paid by the Company. Employees also subscribe to additional insurance of a larger amount, for which they pay by payroll deduction at low premium rate. During 1927, total claims paid to families of Schenectady employees were over \$260,000.

A Relief and Loan Plan maintained for employees at Schenectady makes loans to its members who may be in need of funds on account of temporary unemployment, illness, or other emergency. The fund is provided by monthly payments by members, with an equal amount contributed by the Company. During the last year, loans to employees have reached nearly \$75,000.

The Company welcomes suggestions from its employees toward improvements in manufacture or design of apparatus or changes tending to increase the safety of working conditions. All suggestions are carefully considered, and merited awards are paid to the employees.

A Mutual Benefit Association, conducted by employees, has paid sickness and death benefits for the last several years. Recently there has been added a hospitalization benefit feature. Membership fees and dues are collected by the Company by payroll deduction, and all employees under 55 years of age are eligible to join the Association. More than \$1,000,000 has been paid to employees during the last 15 years.

The Company has maintained for many years a Pension System for retiring employees after they have reached the age of 70 years with a continuous service of 20 years or more. Recently a provision was added to the Pension Plan whereby employees may contribute a portion of their annual earn-



MAIN BROADCASTING STUDIO OF WGY, BUILDING 36

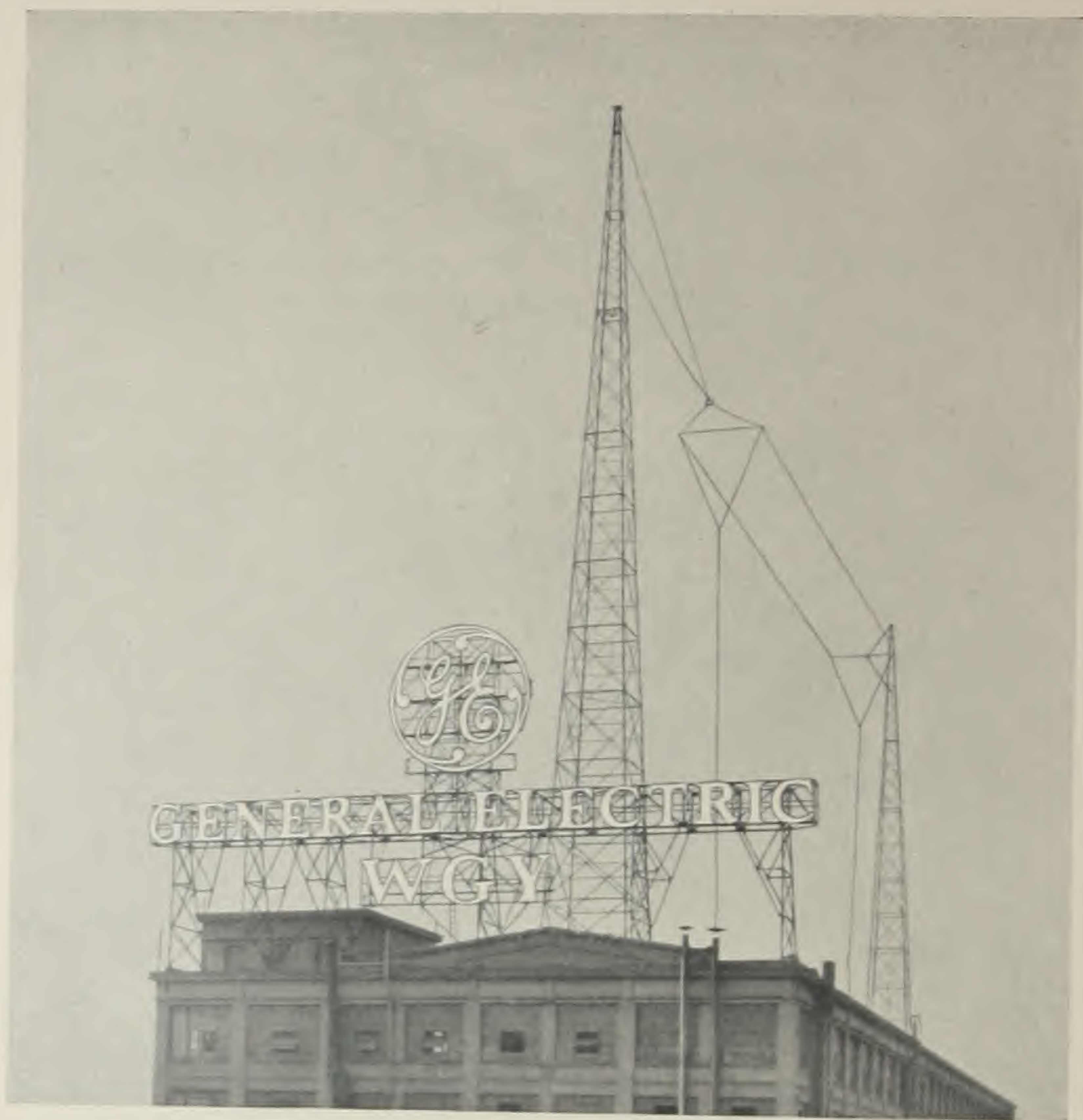
ings to a fund maintained by the Company. Under the new plan, the employee may retire at the age of 65 years; he then receives his accumulated funds in addition to the usual pension payment.

A Works Council has been organized at Schenectady for the consideration of problems pertaining to the employees and their relationships with the management. It is composed of elected representatives of the employees, the Works Manager, and other Works executives. Regular meetings are held to discuss and solve questions and make recommendations concerning Works policies and conditions affecting all employees.

A General Safety Committee composed of representatives from every department in the factory is organized to promote "safety first" throughout the Works. It supervises accident-prevention campaigns and assists materially in the reduction of lost-time accidents and serious injuries to employees.

A fully equipped hospital with a large staff of physicians and nurses is maintained. Emergency service and subsequent treatment are afforded all injured employees. First-aid service is rendered in the case of illness, after which the employee is referred to his family physician. X-ray service is available to all employees for purposes of diagnosis. The hospital staff maintains a high standard of sanitation throughout the factory and furnishes rest rooms wherever women are employed.

Social and recreational advantages are provided for those in the service of the Company. Prominent among these is the Edison Club, which furnishes modern club facilities to members of the Testing Department and to the younger engineers. Its equipment includes a club house with reading and billiard rooms, a large hall for lectures, dances, and dinners, bowling alleys, and a boat house. A country club also has been organized for the benefit of student engineers. Its club house and golf links are on the bank of the Mohawk River, a few miles from Schenectady.



THE TOWERS OF WGY

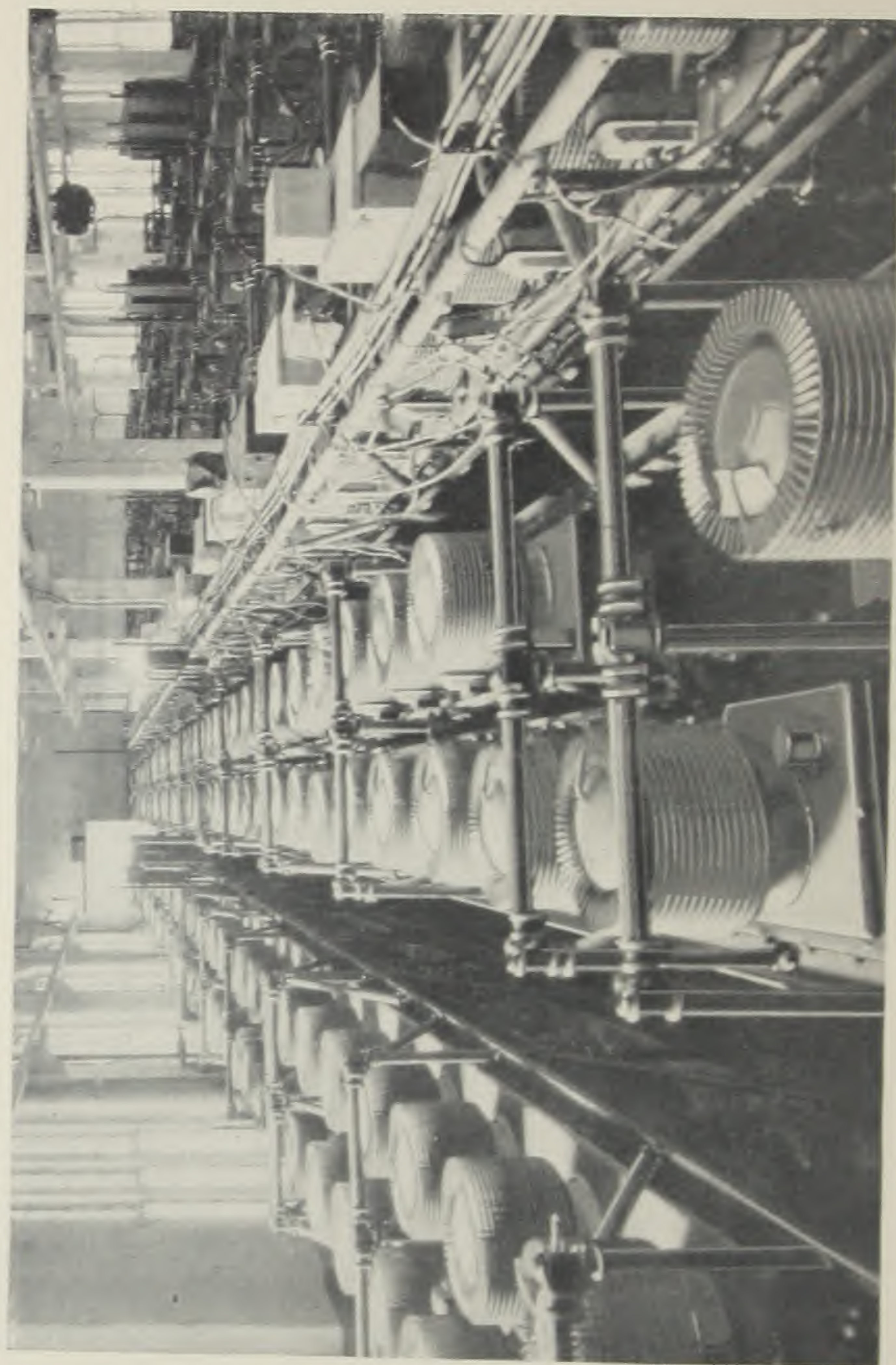
The broadcasting towers of WGY are on the roof of Building 40.
The Company also maintains a large developmental
station at South Schenectady

The General Electric Woman's Club, organized for the promotion of acquaintance and mutual helpfulness among women employees of the Company, has its home a short distance from the Works. Here athletic classes are conducted and social events are held. Lunch is served daily at a small charge. A well-appointed summer camp on Lake George has been established for the women and girls of the G-E organization. Carefully supervised and with every facility for outdoor enjoyment, it offers an ideal vacation place at a cost that barely covers expenses.

An athletic field, with baseball diamonds, tennis courts, and track facilities, is maintained by the Company for the encouragement of individual development and for group sports.

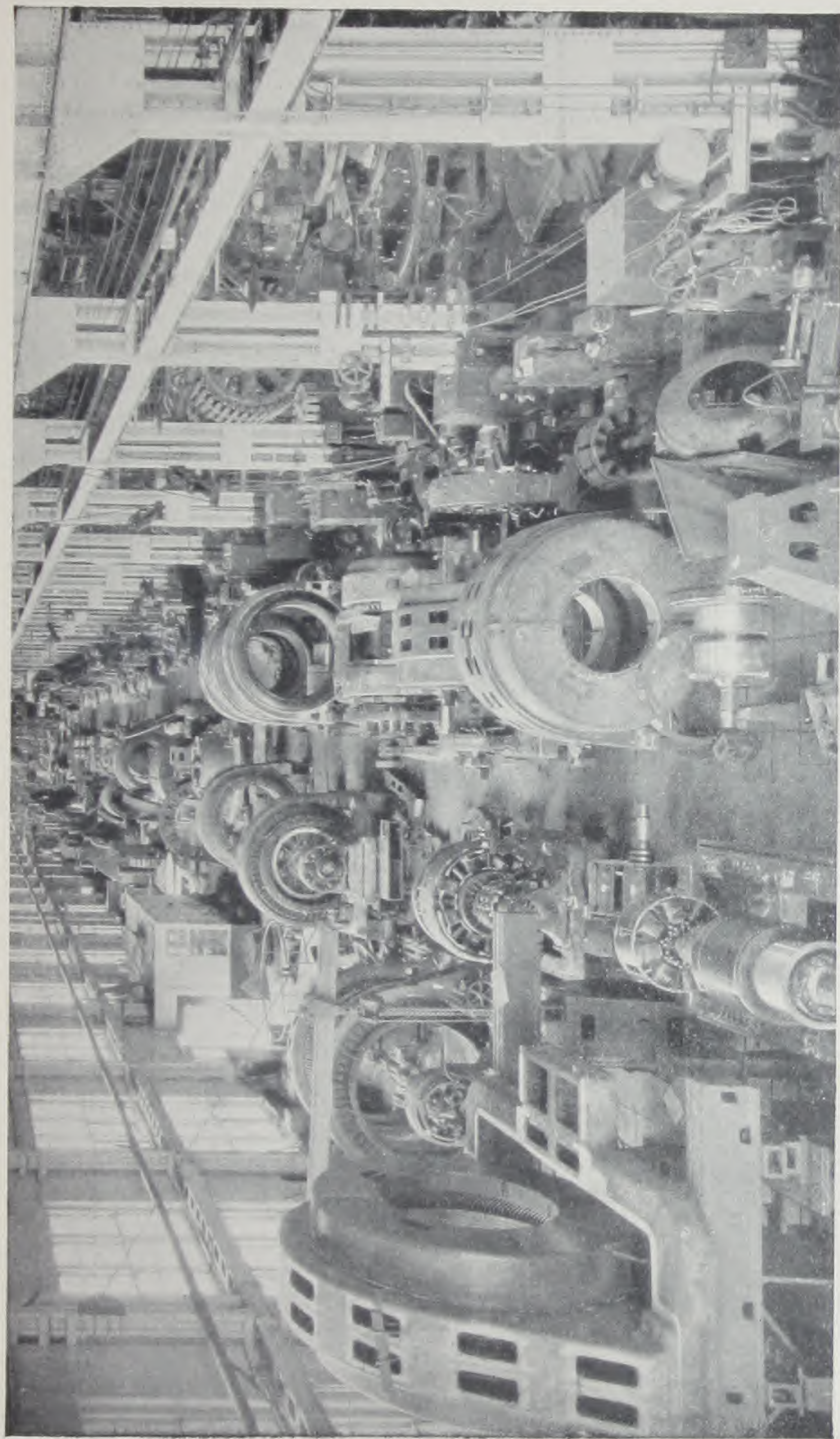


The Schenectady Works of the General Electric Company was established in 1886, when the Edison Machine Works (afterwards part of the Edison General Electric Company) acquired two buildings (now known as 10 and 12) on the site of the present plant and began operations with about 300 employees. In 1892, the Edison General Electric Company and the Thomson-Houston Electric Company, of Lynn, Mass., were merged under the name, General Electric Company. In addition to the plants at Schenectady and West Lynn, there are now large factories at Pittsfield, Mass.; Erie, Pa.; Ft. Wayne, Ind.; Bridgeport, Conn.; Philadelphia, Pa.; Baltimore, Md.; Harrison, N. J.; and Cleveland, Ohio; besides smaller factories in other cities. In all, there are 15 plants, having an aggregate floor space of 26,500,000 square feet and employing more than 70,600 men and women. Each of these plants specializes in particular lines of products, while some of them, as in the case of lamp factories, are restricted to one.

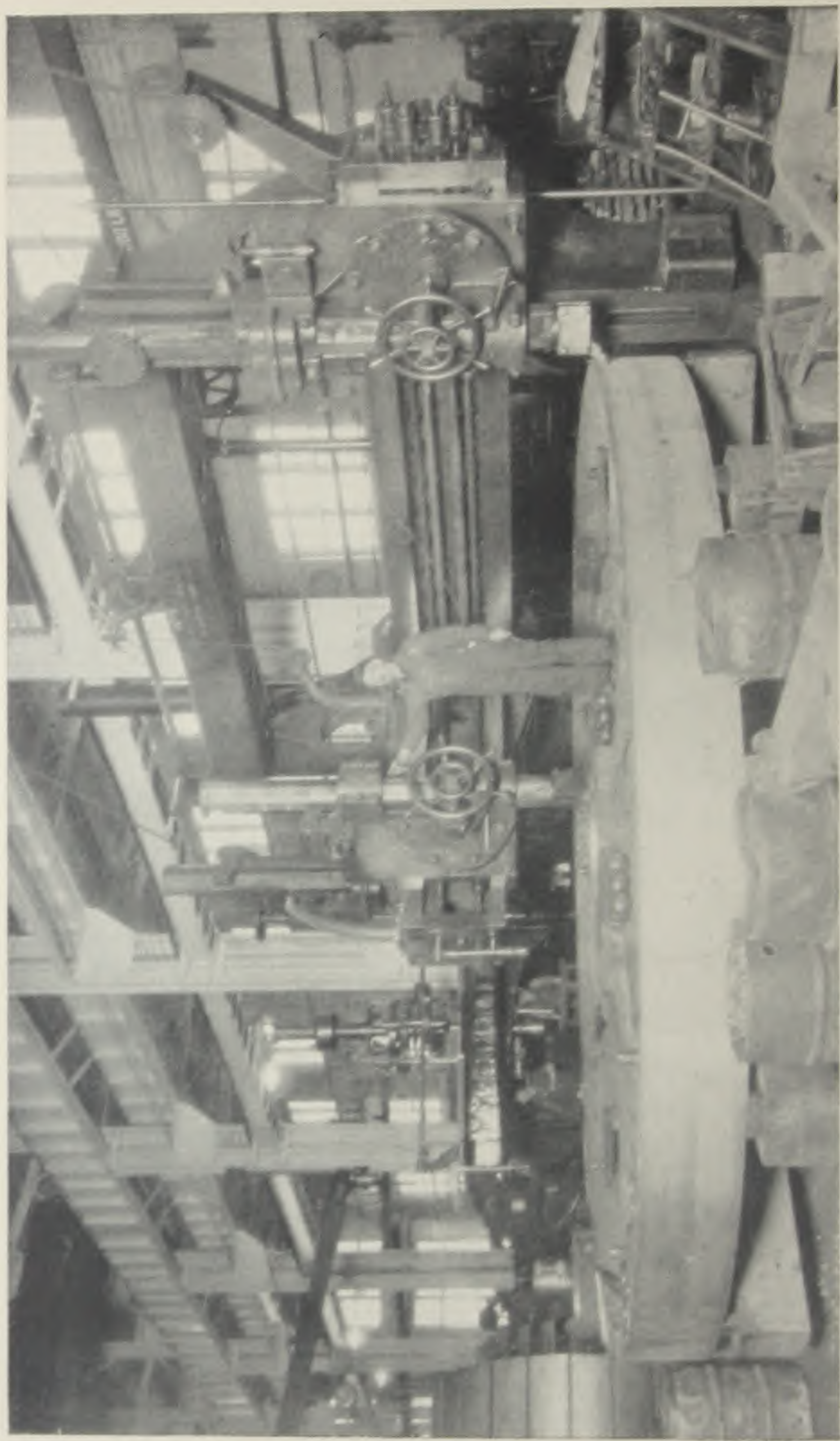


REFRIGERATOR DEPARTMENT, BUILDING 23

In this view of the conveyORIZED running storage, a part of the daily output of refrigerating units may be seen



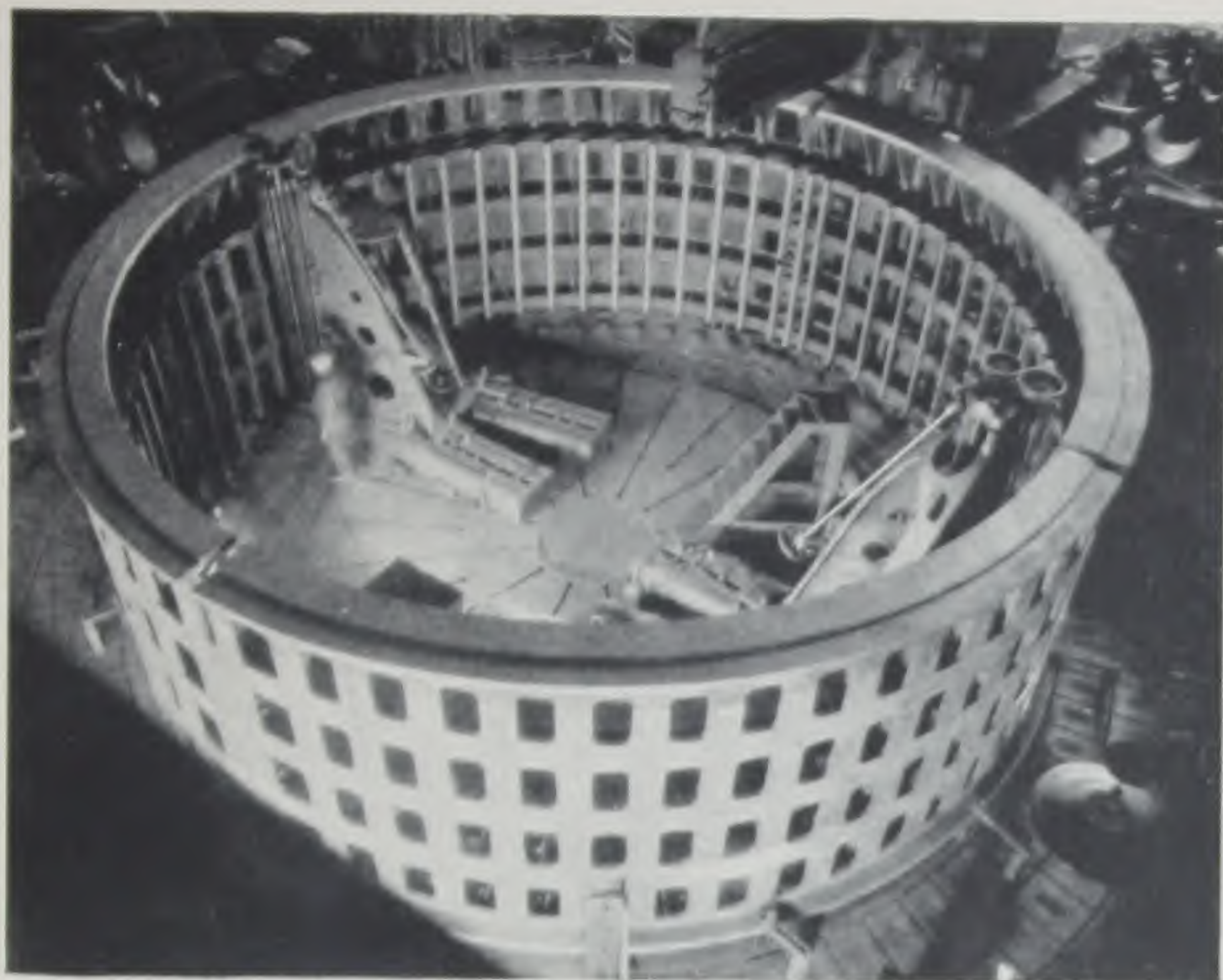
ONE OF THE SIDE BAYS, BUILDING 16



MACHINING THE ROTATING ELEMENT FOR A LARGE GENERATOR, BUILDING 16

Some of the castings machined in this building are so large that they are set

up on the floor and the machine tools brought to them

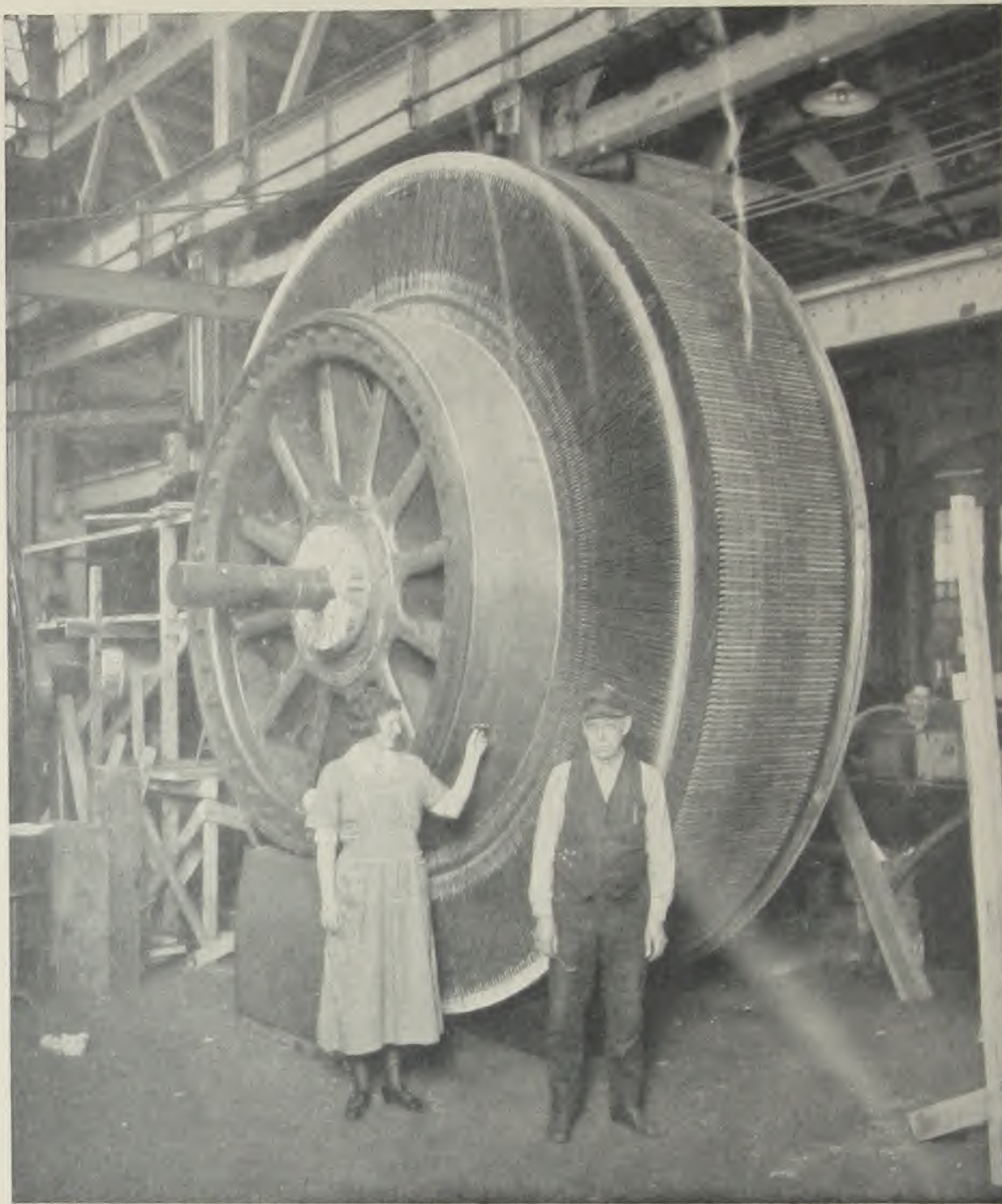


MACHINING THE STATOR FRAME OF A 65,000-KILOWATT
WATERWHEEL-DRIVEN GENERATOR

This is the largest generator of its kind ever built

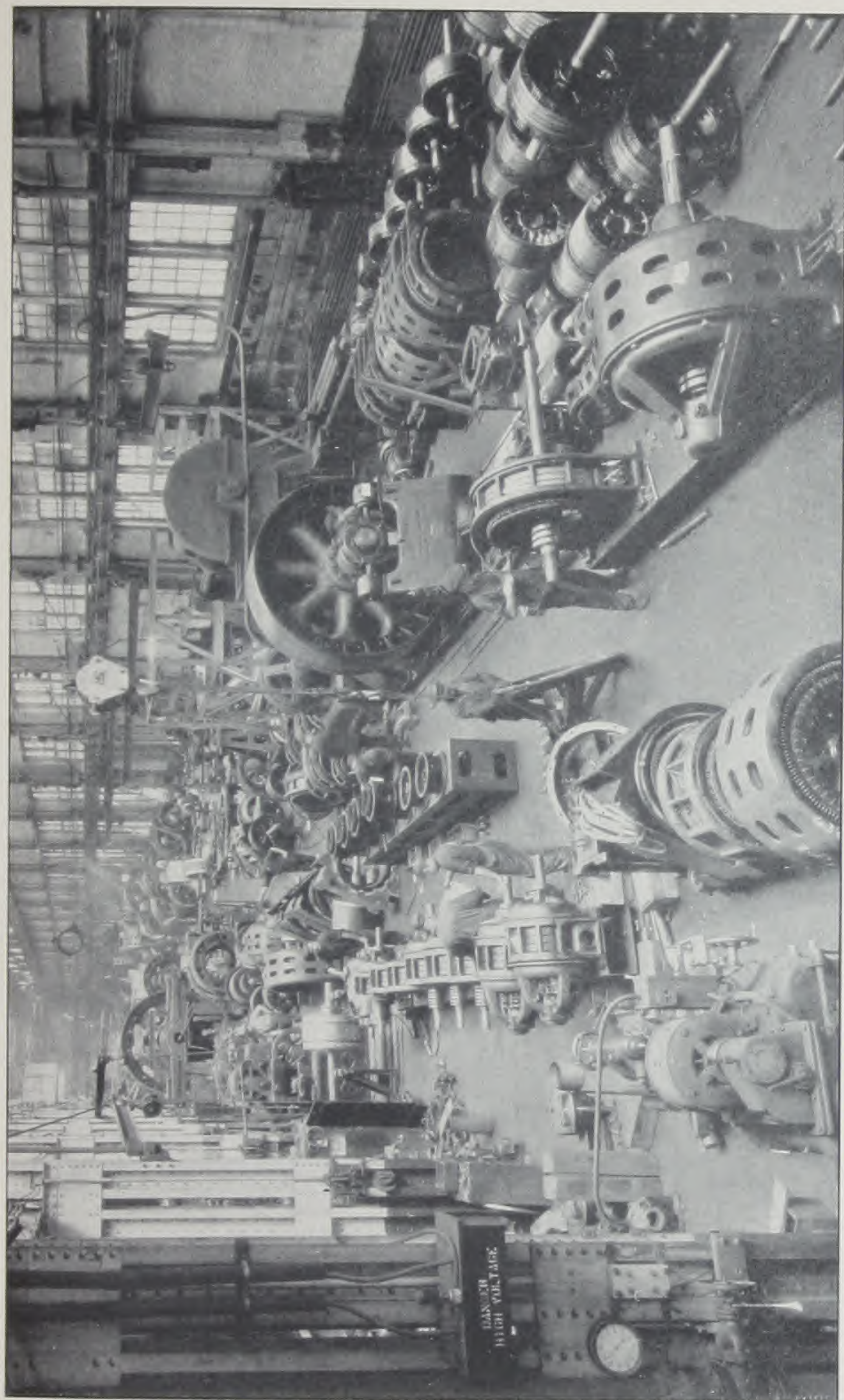


AN ELECTRIC FURNACE USED FOR MELTING
BRASS, BUILDING 105



A CONTRAST IN ARMATURES

The small armature is of the kind built for a $1/30$ -hp. motor and weighs less than a pound; the large one, built in Building 15, weighs 96,000 lb. and is for a 4500-hp. steel-mill motor



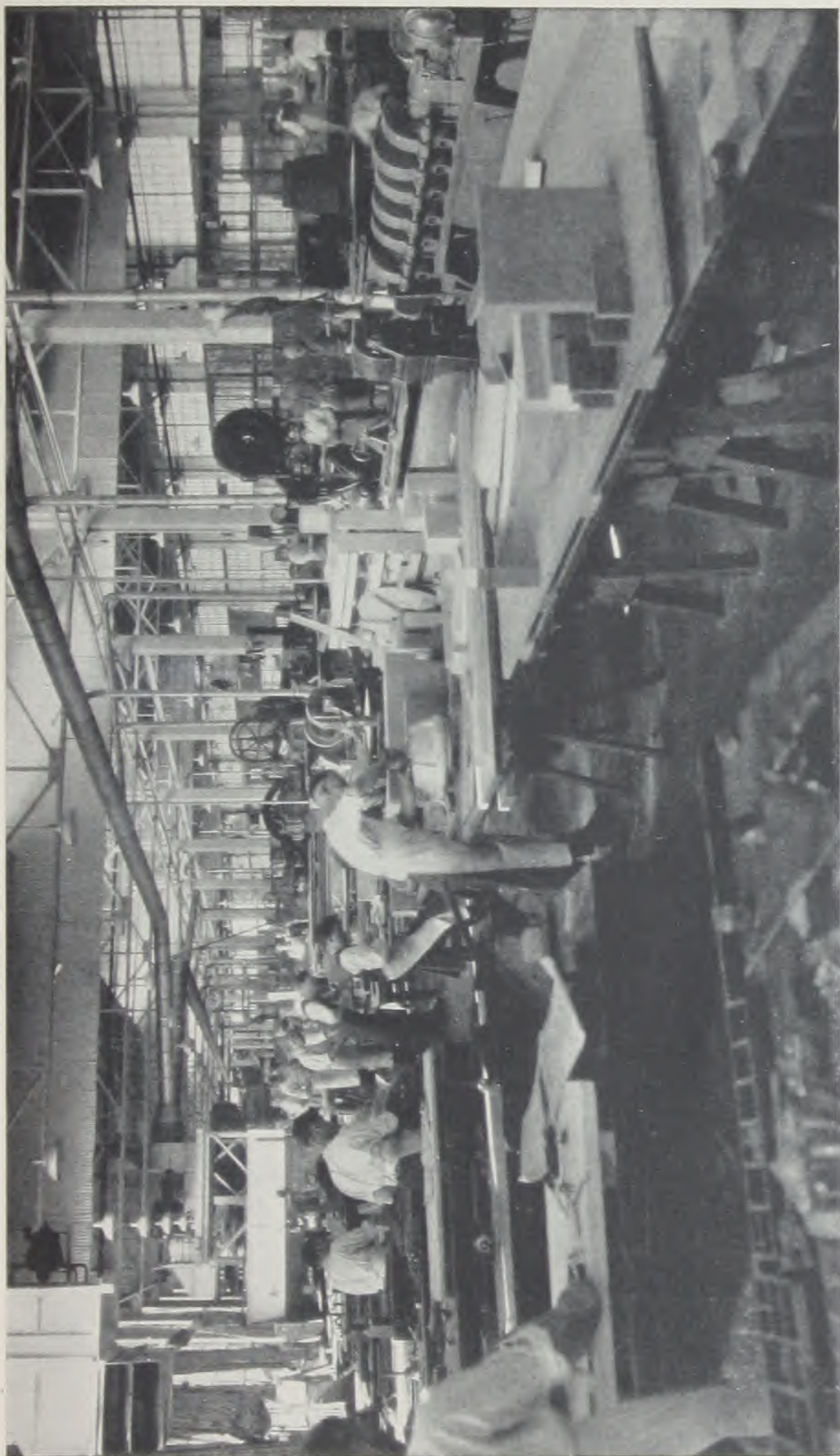
A VIEW IN BUILDING 18

This building is devoted to the manufacture and testing of motors



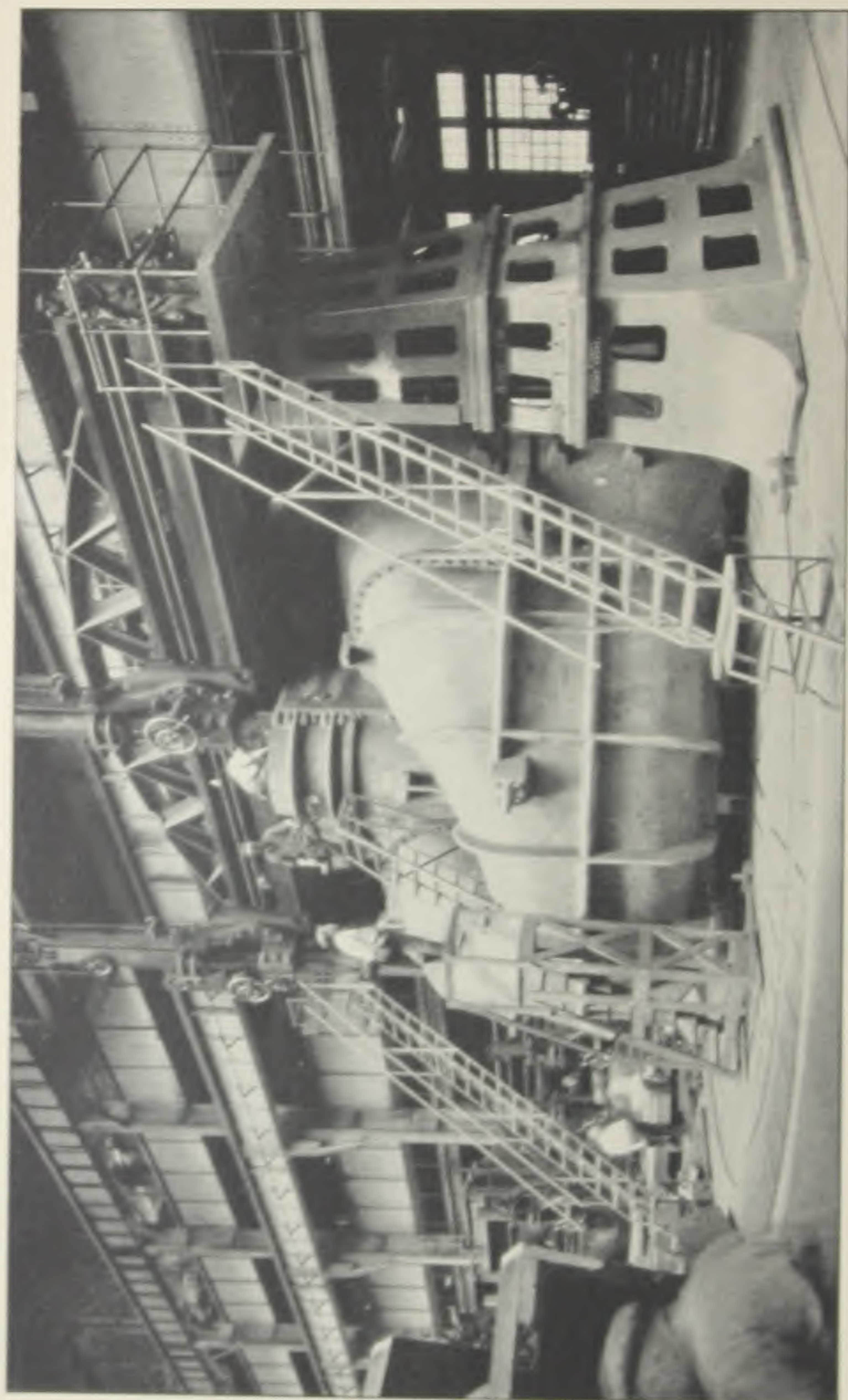
MASS PRODUCTION OF MOTORS, BUILDING 40

Practically the whole of this large, five-story building is devoted to the different processes necessary to build induction motors in large quantities



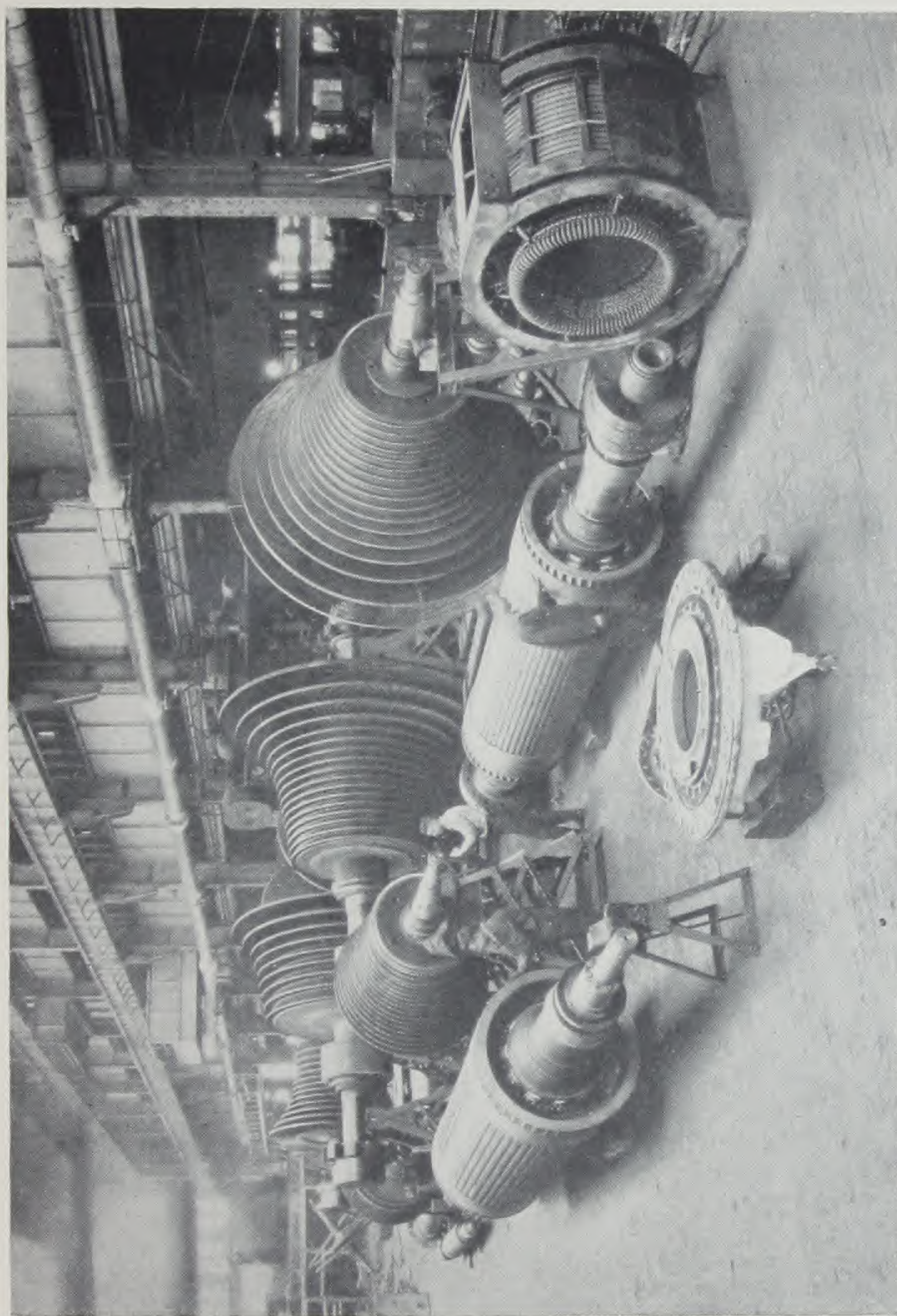
PATTERN SHOP, BUILDING 99

Patterns for many of the castings used at the Schenectady Works are made here



MACHINING A LARGE TURBINE CASTING, BUILDING 60

The huge dimensions of the casting can be estimated by comparison with the workers

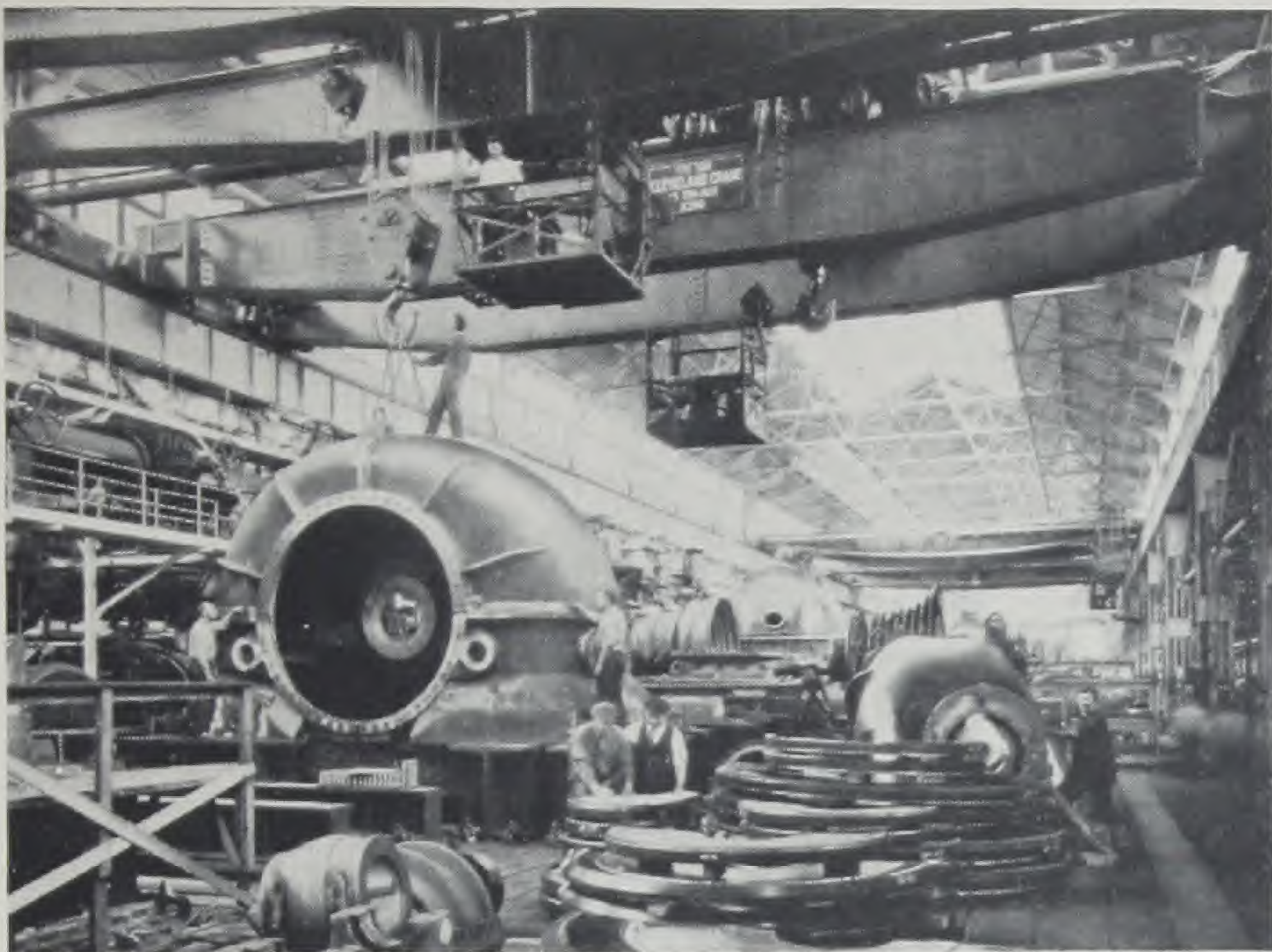


STEAM-TURBINE AND GENERATOR ROTORS, BUILDING 60



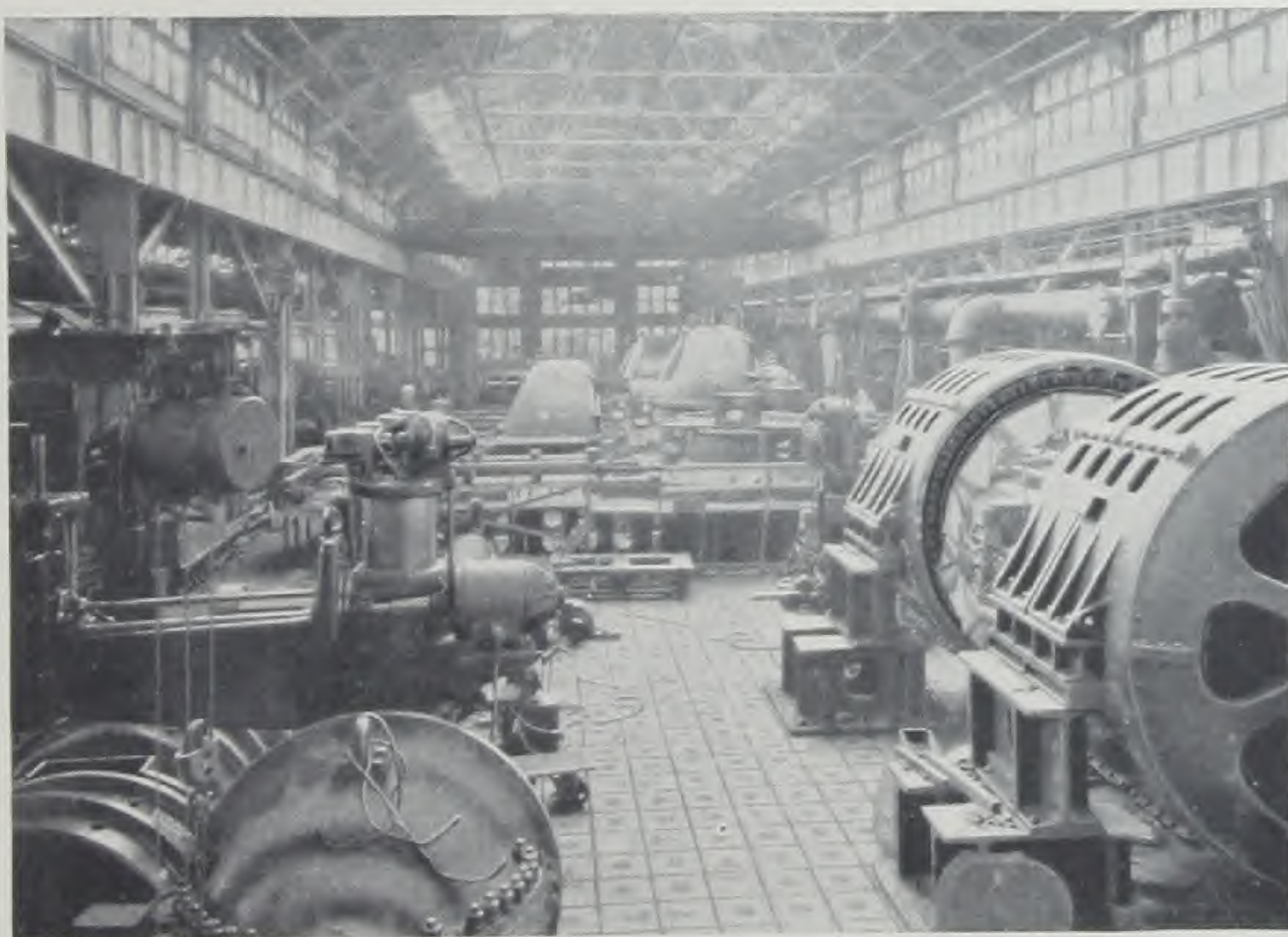
ASSEMBLING RADIO RECEIVING SETS, BUILDING 77

Besides receiving sets, there are also manufactured in this building tube transmitter sets for telegraph, radio broadcasting transmitters, and carrier-current sets for central-station communication

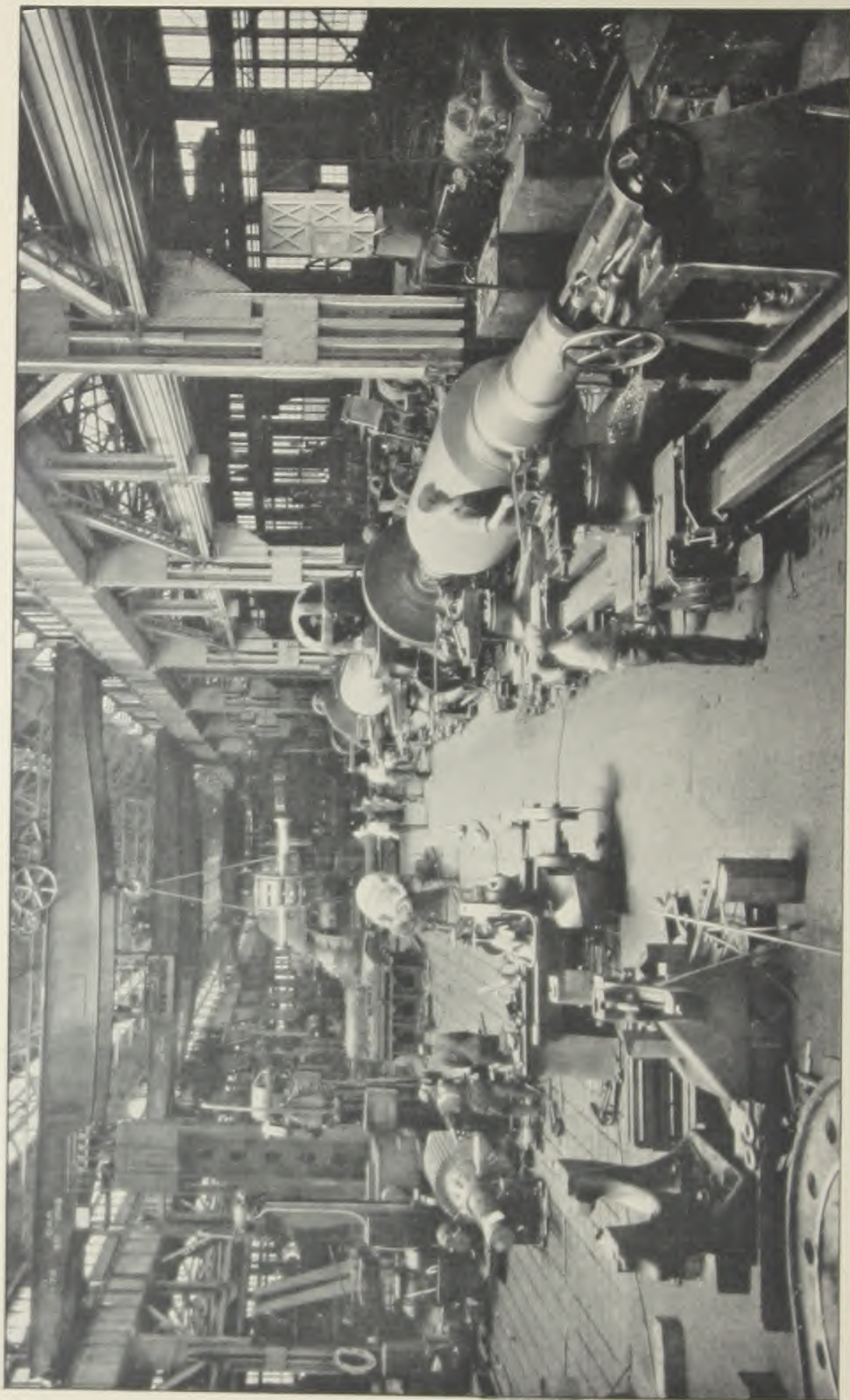


TURBINE DEPARTMENT, BUILDING 49

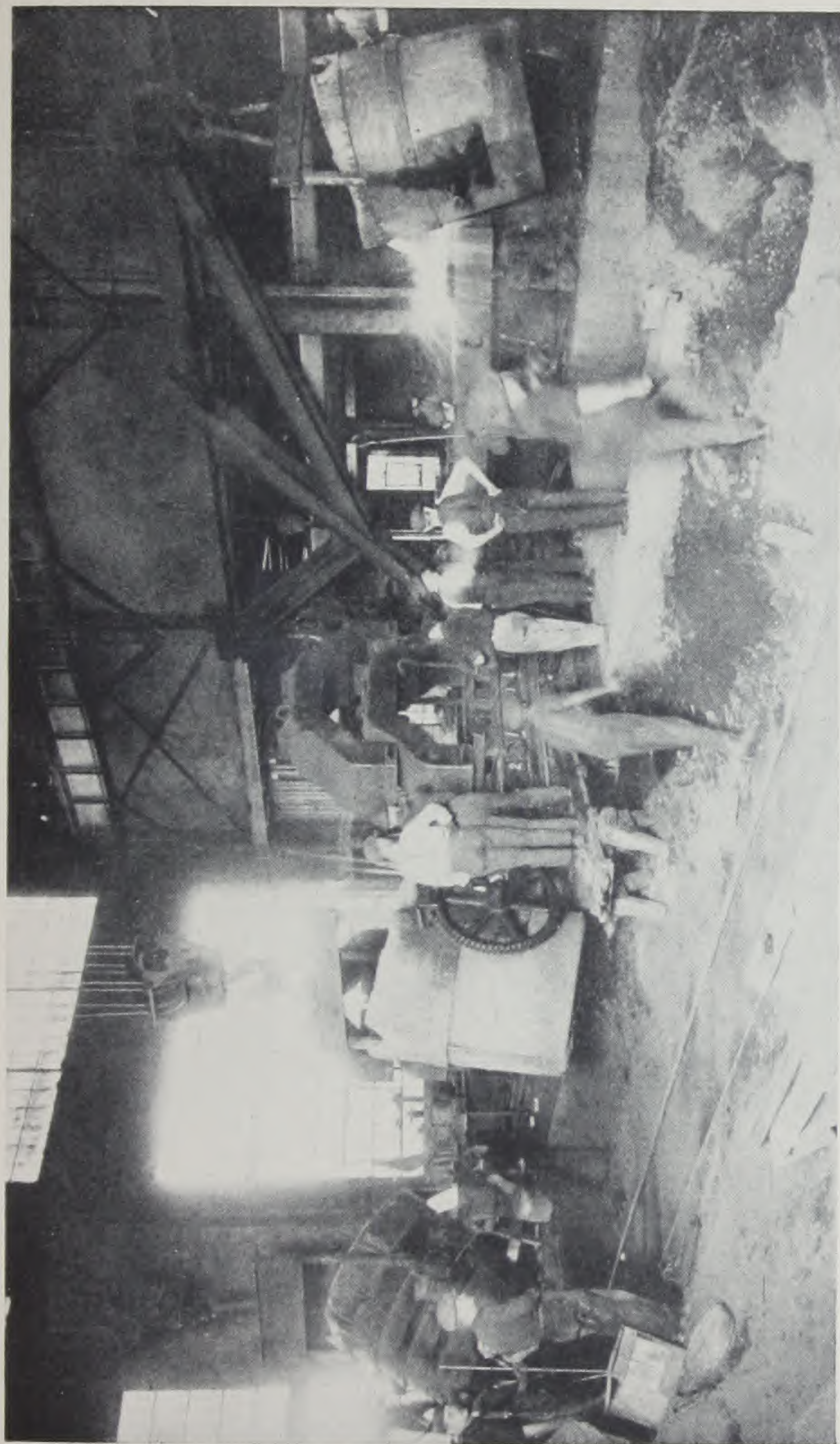
Steam turbine-generators are assembled and tested in this building



TESTING-FLOOR FOR STEAM TURBINE-GENERATORS,
BUILDING 49

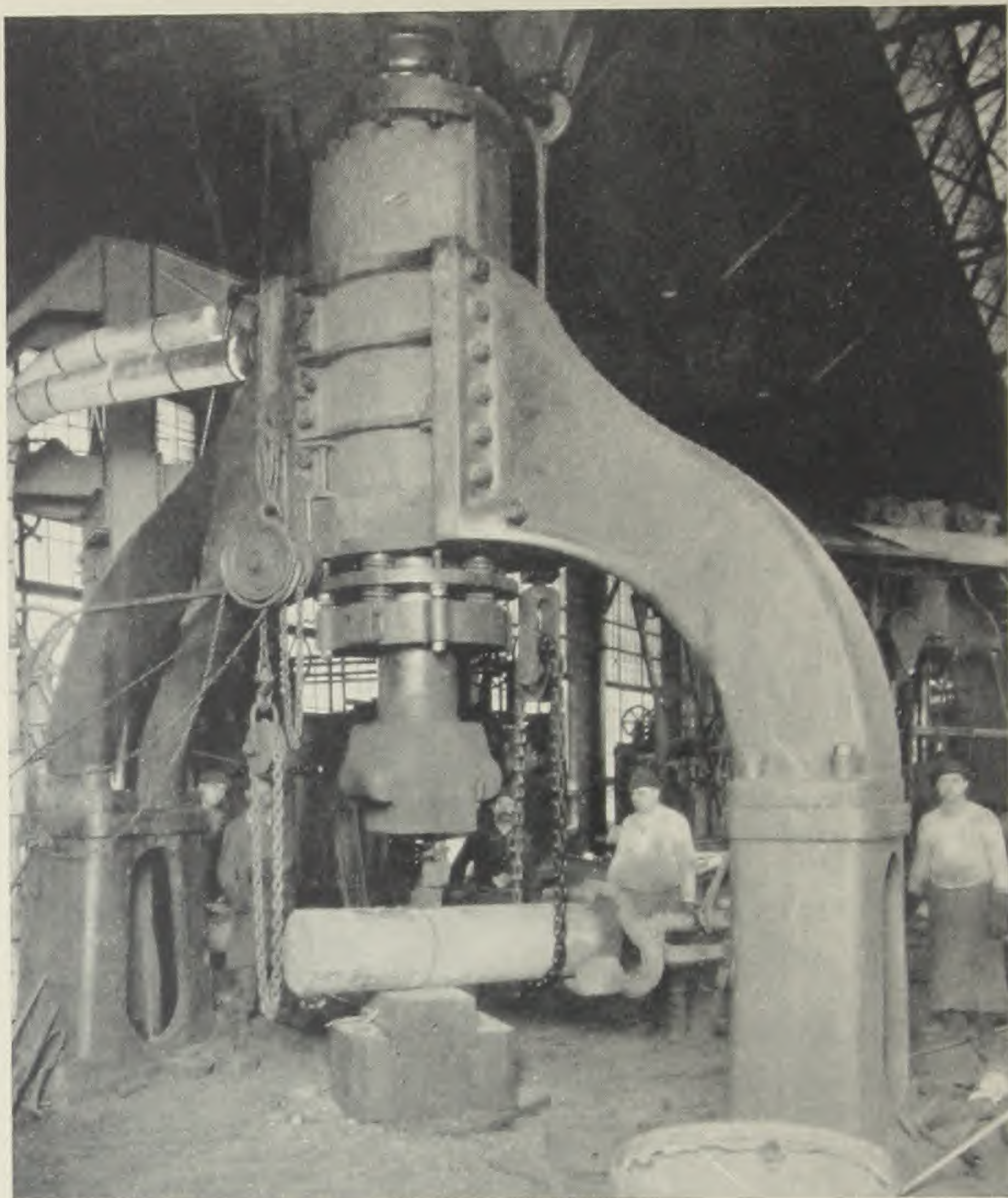


MACHINING TURBINE-GENERATOR ROTORS, BUILDING 49



IRON FOUNDRY, BUILDING 95

Pouring a 40,000-kw. exhaust-hood casting from three ladles
containing 55 tons of metal



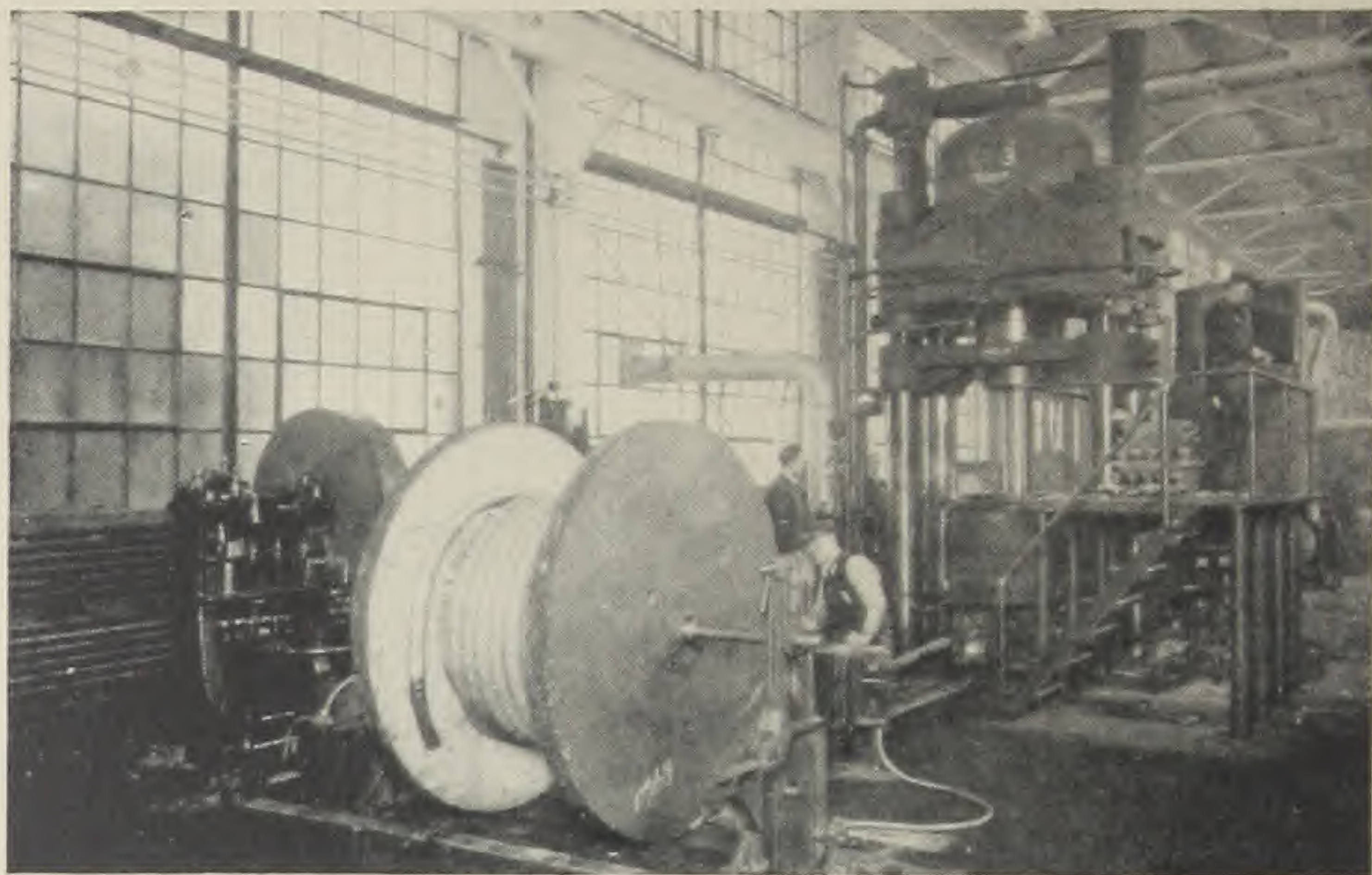
A 12,000-POUND TRIP HAMMER, BUILDING 94

This shop is entirely devoted to forging-hammers, ranging from 250-pound electric motor-driven, drop-board hammers to the giant in the picture

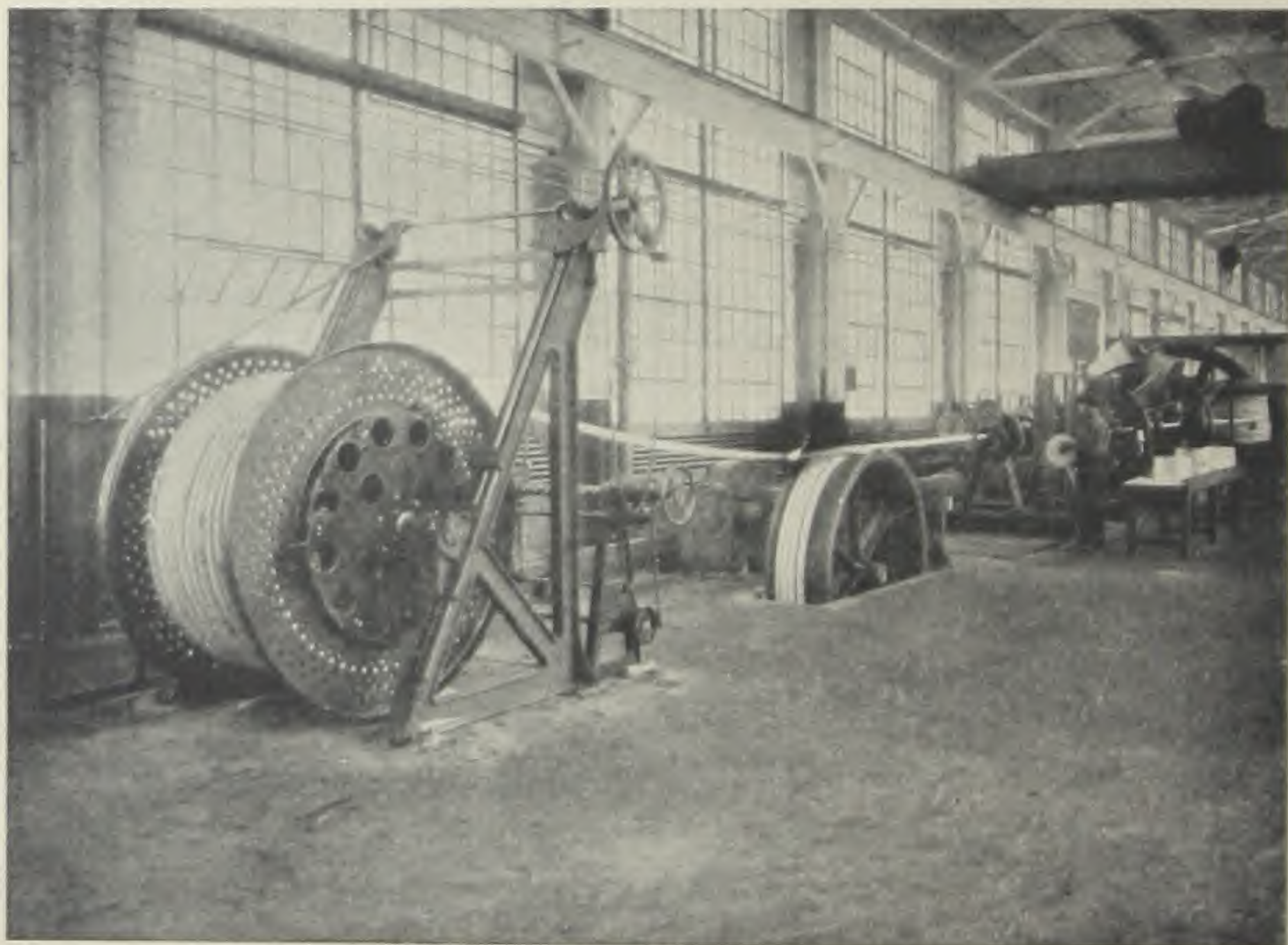


ONE OF THE PORCELAIN-FIRING KILNS, BUILDING 68

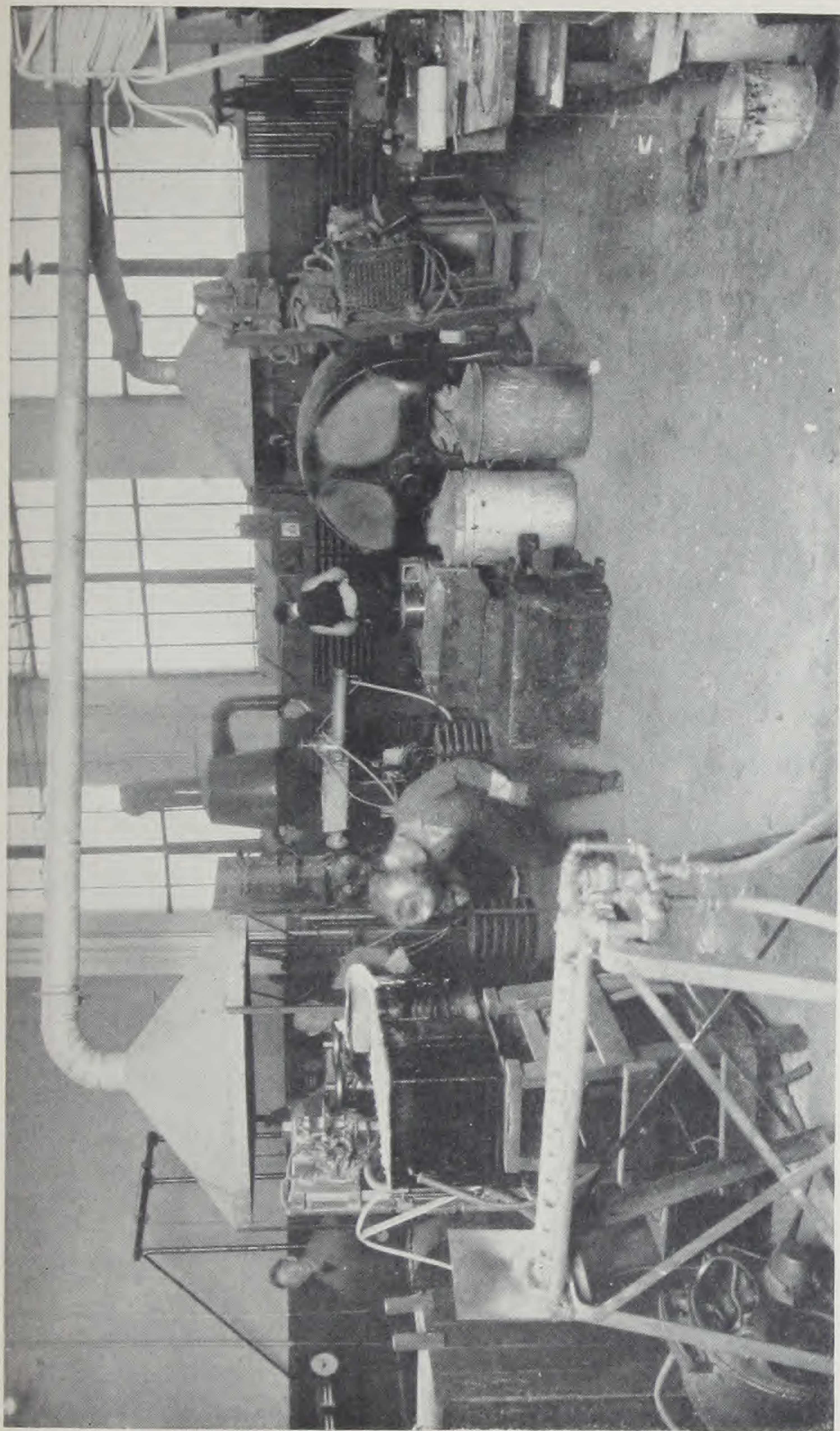
The porcelain products made in this building range in size from the giant insulators 6 to 8 feet high shown in this picture to tiny switch parts measured in fractions of an inch



A 10,000-POUND HYDRAULIC PRESS FOR SHEATHING
CABLES WITH LEAD, BUILDING 85

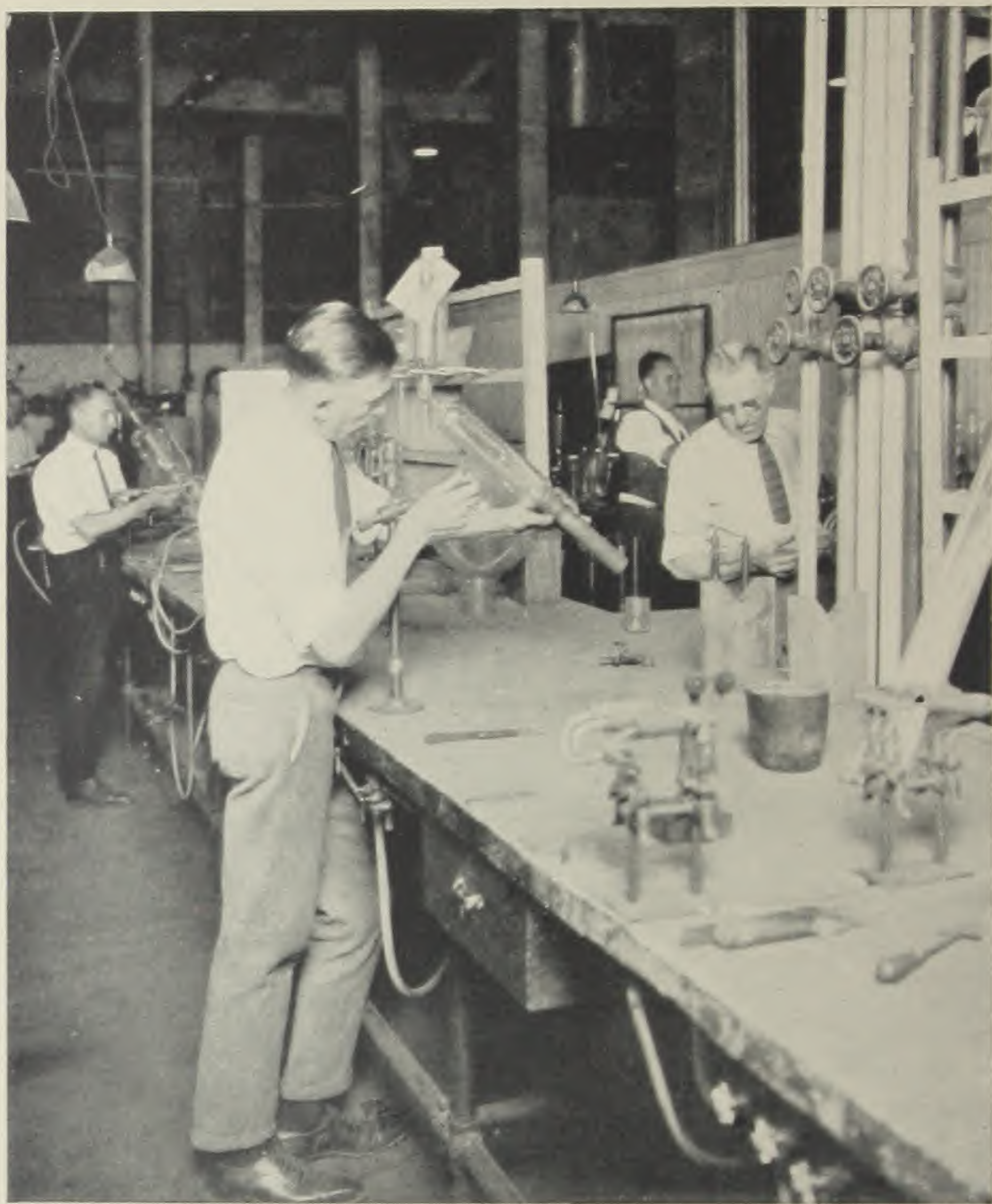


ONE OF THE CABLE-WRAPPING MACHINES,
BUILDING 85



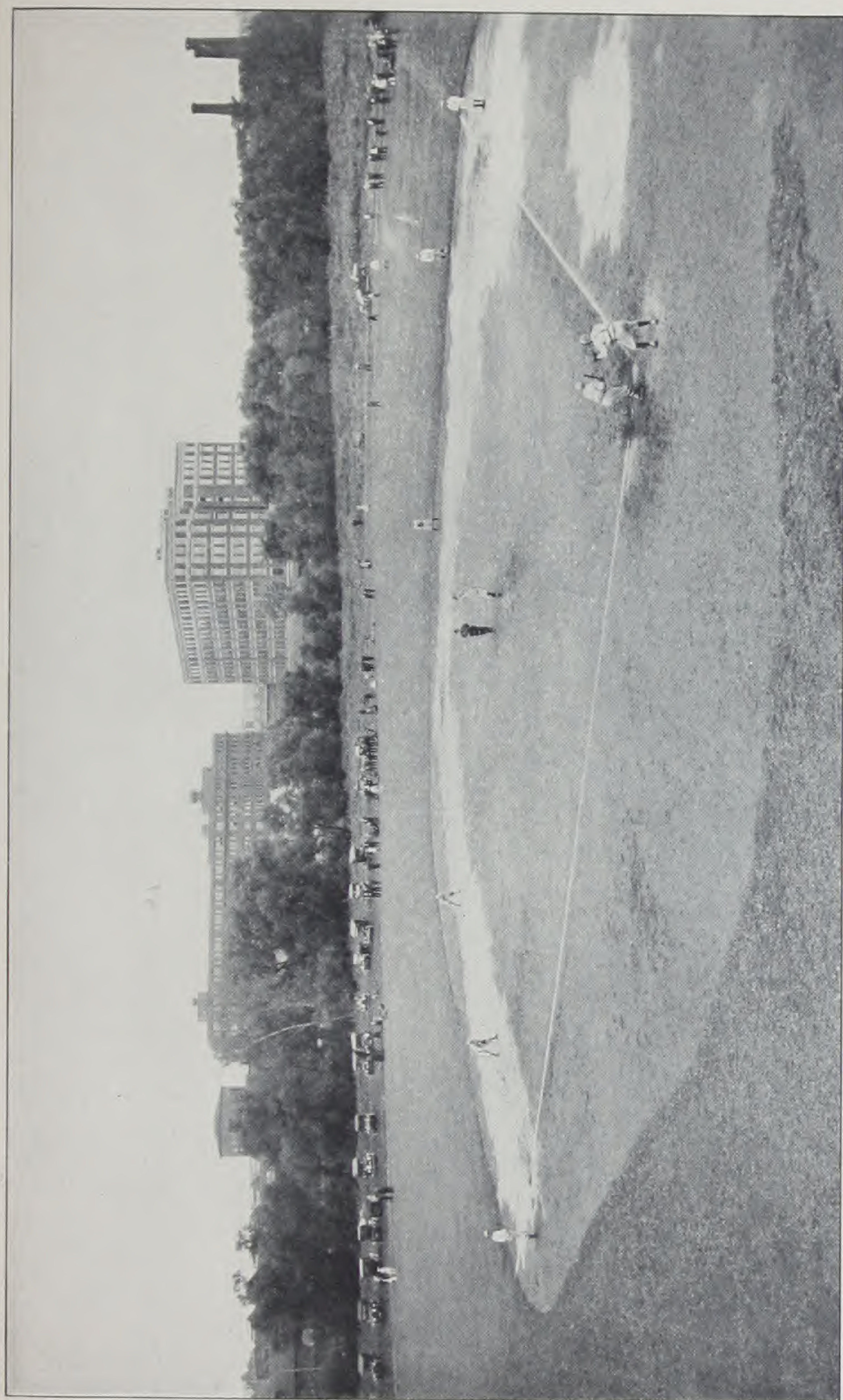
IN THE RESEARCH LABORATORY, BUILDING 5

In this room, ductile tungsten is produced, such as
is used in lamp filaments, etc.



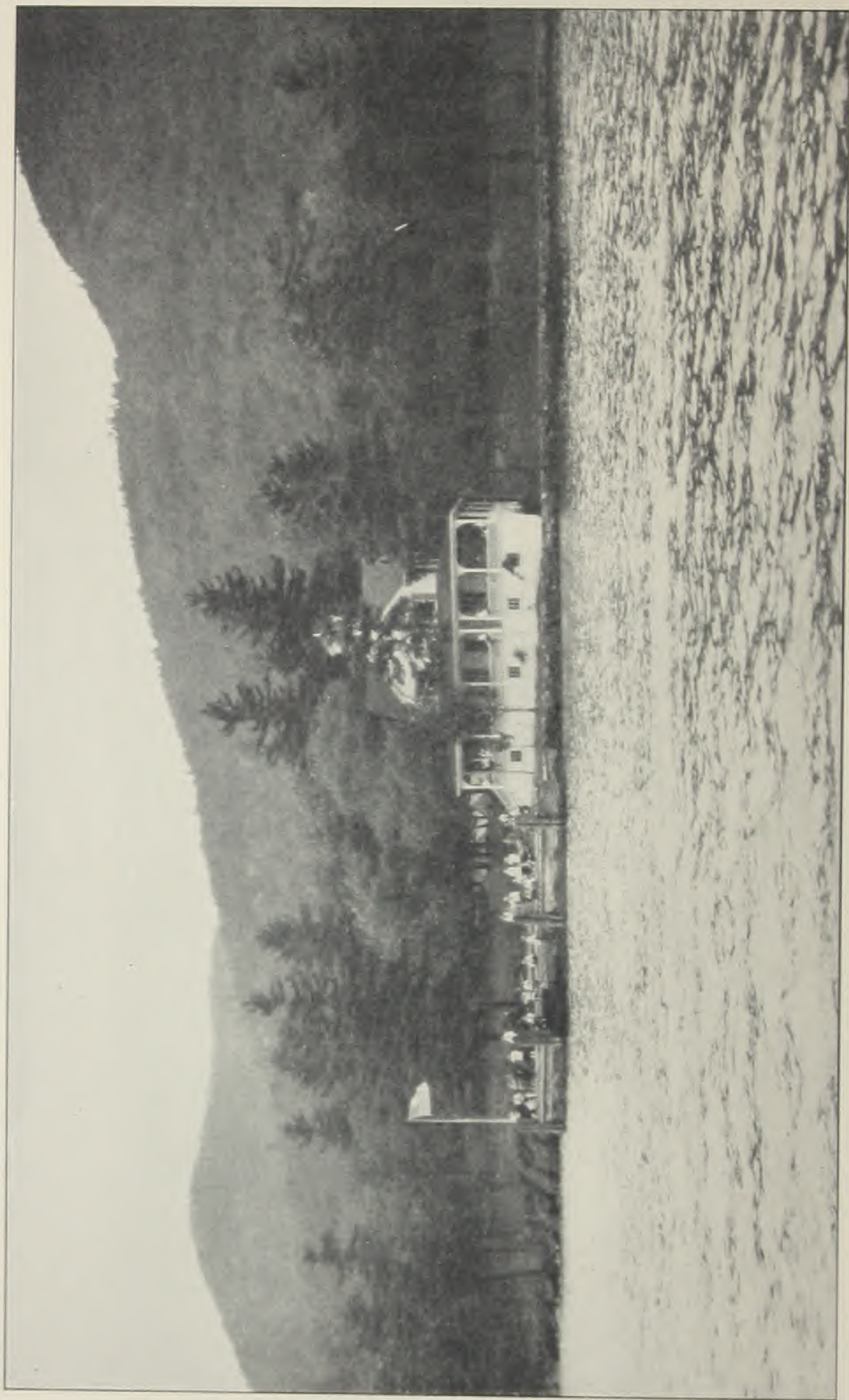
BLOWING GLASS, BUILDING 37

Many different kinds of glassware, such as x-ray tubes, mercury-arc rectifier tubes, and all varieties of tubes for experimental work, are blown in this shop



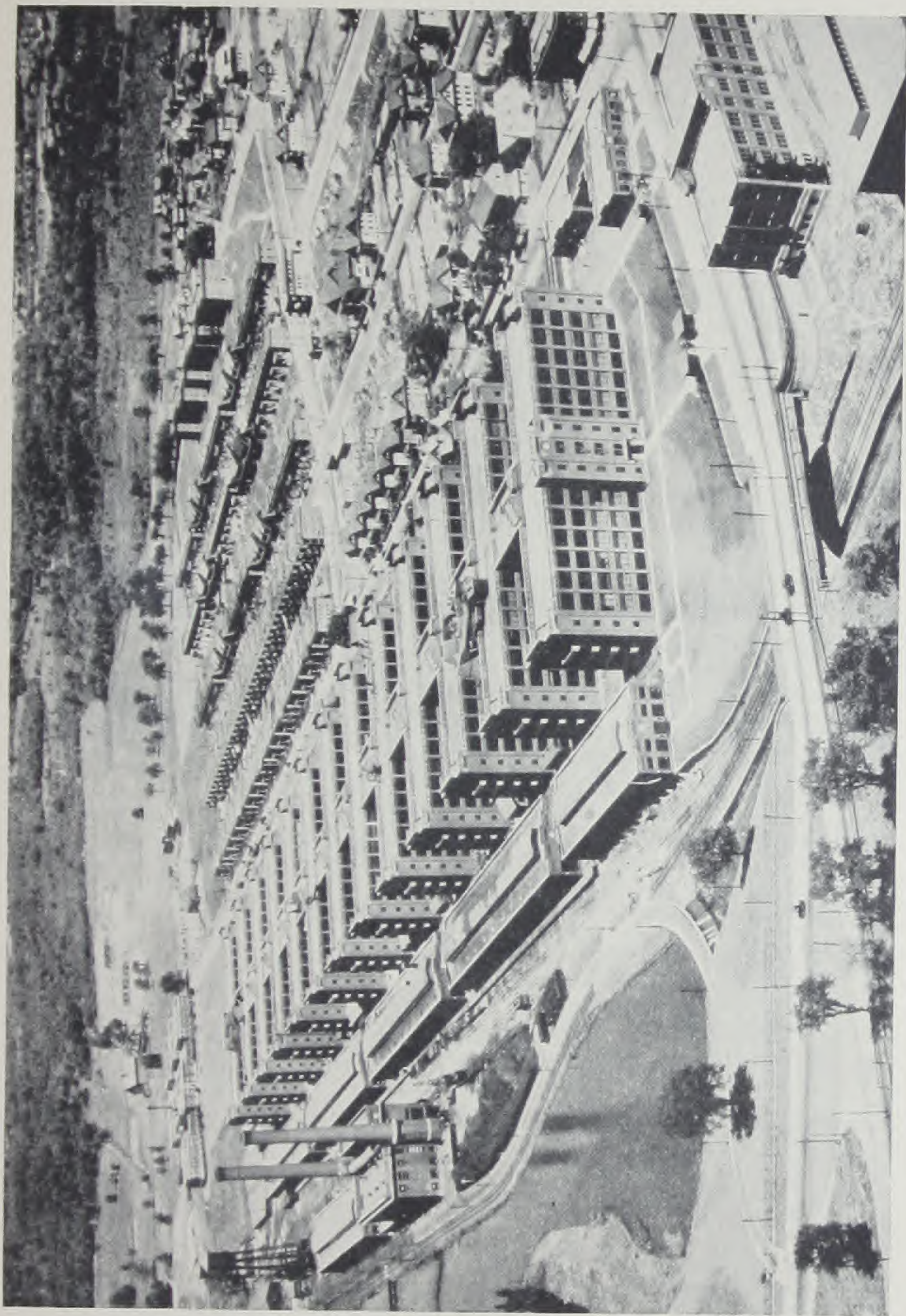
A BASEBALL GAME ON THE ATHLETIC FIELD

This field provides facilities for baseball, football, track events, tennis, and other sports

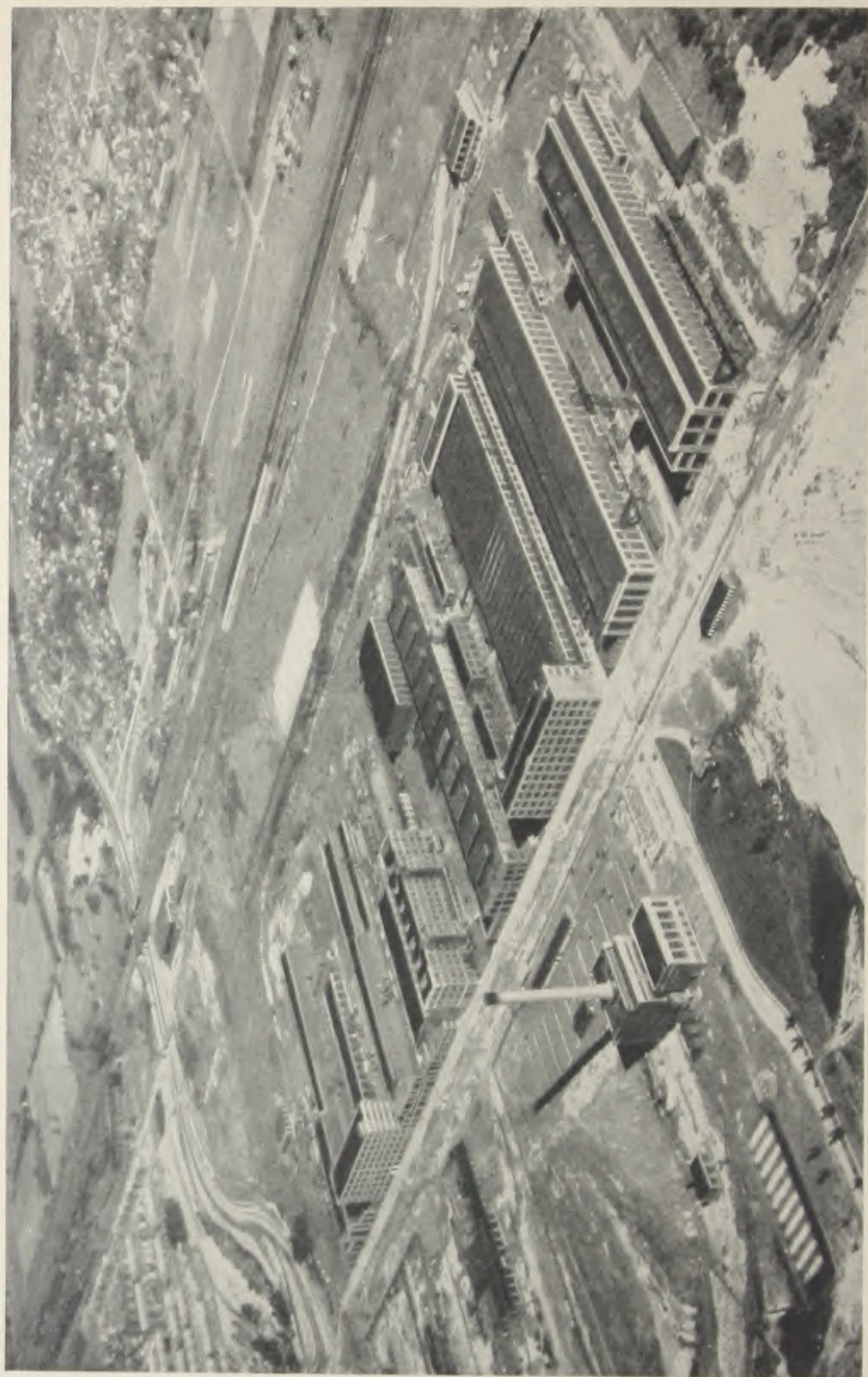


G-E GIRLS' CAMP AT FRENCH POINT, LAKE GEORGE

The beautiful surroundings and modern equipment of this camp make it a favorite vacation playground for women employees



THE PLANT AT BRIDGEPORT, CONN.
Employees, 3020; floor space, 1,573,000 square feet



THE PLANT AT ERIE, PA.

Employees 1250; floor space 2,675,000 square feet



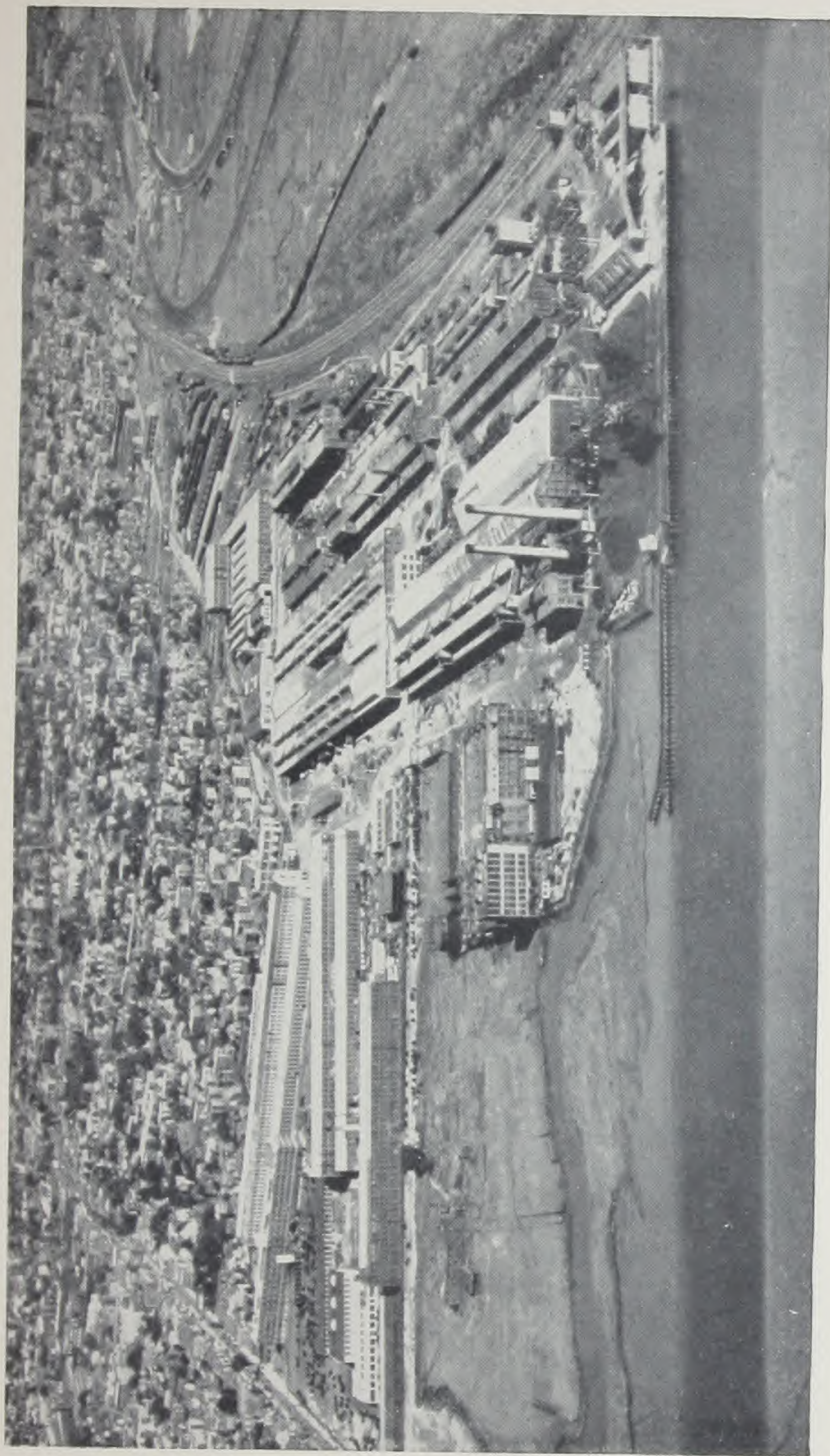
THE PLANT AT FORT WAYNE, IND.

Employees occupy four acres, 1,600,000 square feet



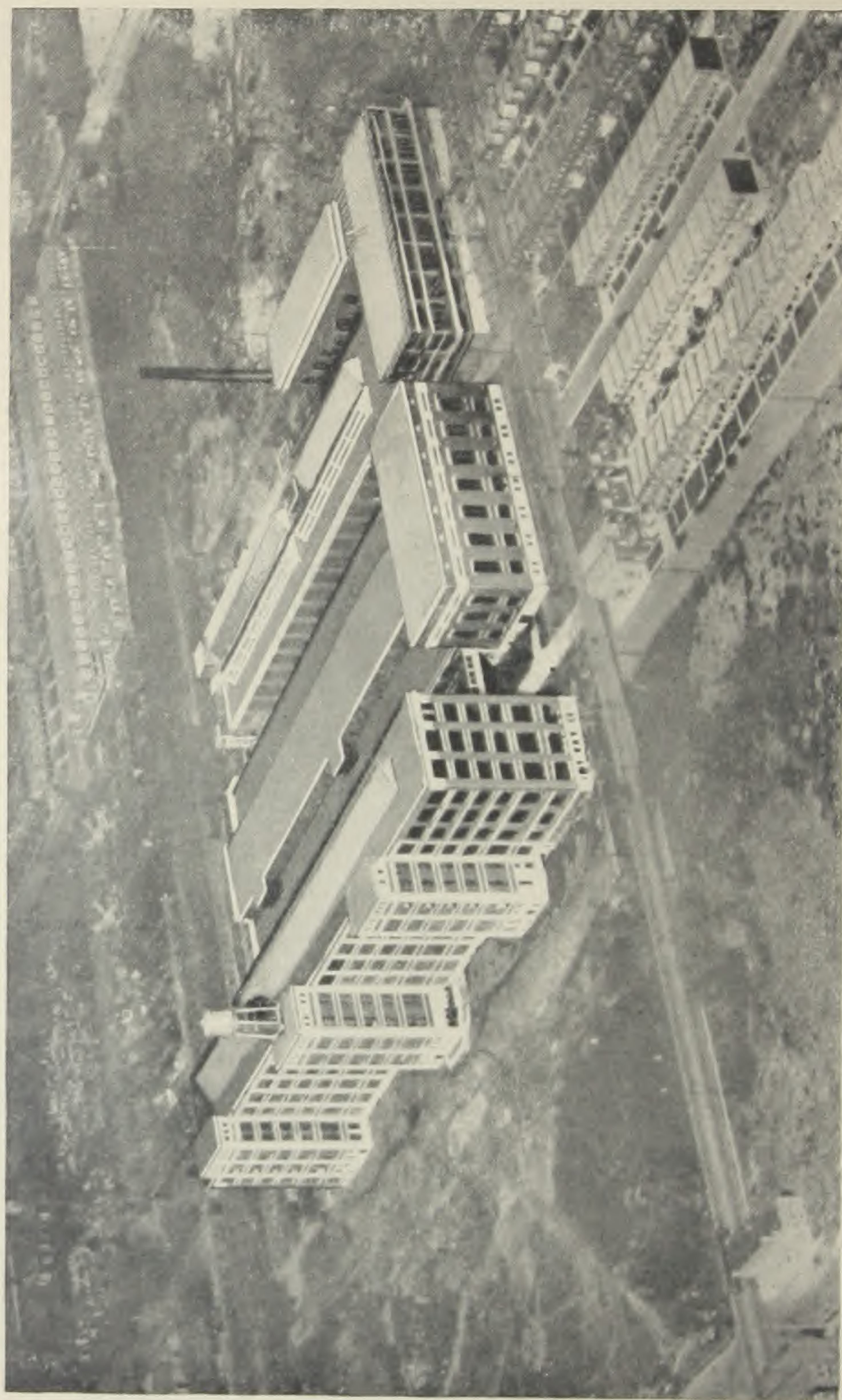
THE PLANT AT PITTSFIELD, MASS.

Employees, 6330; floor space, 2,321,000 square feet



THE PLANT (RIVER WORKS) AT WEST LYNN, MASS.

Employees, 7600; floor space, 2,753,000 square feet



THE PLANT AT WEST PHILADELPHIA, PA.
Employees, 2965; floor space, 1,163,000 square feet

Employees, 2965; floor space, 1,163,000 square feet



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